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THE OFFICIAL MAGAZINE OF
THE DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern.

The Digest is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the Active Army, Army National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

Manuscripts on subjects of general interest to Army personnel are invited. *Direct communication is authorized to: Editor, Army Information Digest, Cameron Station, Alexandria, Va.*

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COVER. All elements of the Pershing system are brought into play in support of the field army. Transporter-erector-launcher is mounted on XM-474 prime mover; two-stage Pershing is fired at right; in background are mobile fire control and communications units.

COMMAND L

Army Views On Vital Issues

A MESSAGE TO ARMY PERSONNEL

"Deeply conscious of the gravity of the obligations which I have assumed as Secretary of the Army, I greet all its members world-wide, both military and civilian, in humbleness of spirit, but with high confidence that together we shall go forward to achieve the goals to which the Army is committed by the nature and urgency of its mission. I shall ever exert my best efforts on behalf of the United States Army as a primary element of our national defense, and in turn I shall count upon the full support of the Army in carrying out, to the best of my ability, the duties and responsibilities of my office."

The Honorable Elvis J. Stahr, jr.
Secretary of the Army

ON ATTITUDES FOR SURVIVAL

"The cost of defense is higher every day; but better that it be purchased now with treasure for adequate defense, than later with blood for indifference. As Sir Winston Churchill said, 'Still, if you will not fight for the right when you can easily win without bloodshed; if you will not fight when your victory will be sure and not too costly, you may come to the moment when you will have to fight with all the odds against you and only a precarious chance of survival. There may ever be a worse case. You may have to fight when there is no hope of victory, because it is better to perish than live as slaves.'

"History records that when a sense of vigilance and a struggle for progress fade in a nation through complacency, the seeds for its own decay are sown . . . Today the problem is not 'Shall we accept a willingness to sacrifice?' because sooner or later we must. The question is 'When and how shall we accept it?' . . . We must realize, in this Age of Great Change, that time is of the essence and that faith, and not fear, and courage not complacency, will be the keys to our survival."

Lt. Gen. Arthur G. Trudeau
Chief of Army Research and Development
before the American Ordnance Association
Washington, D. C.

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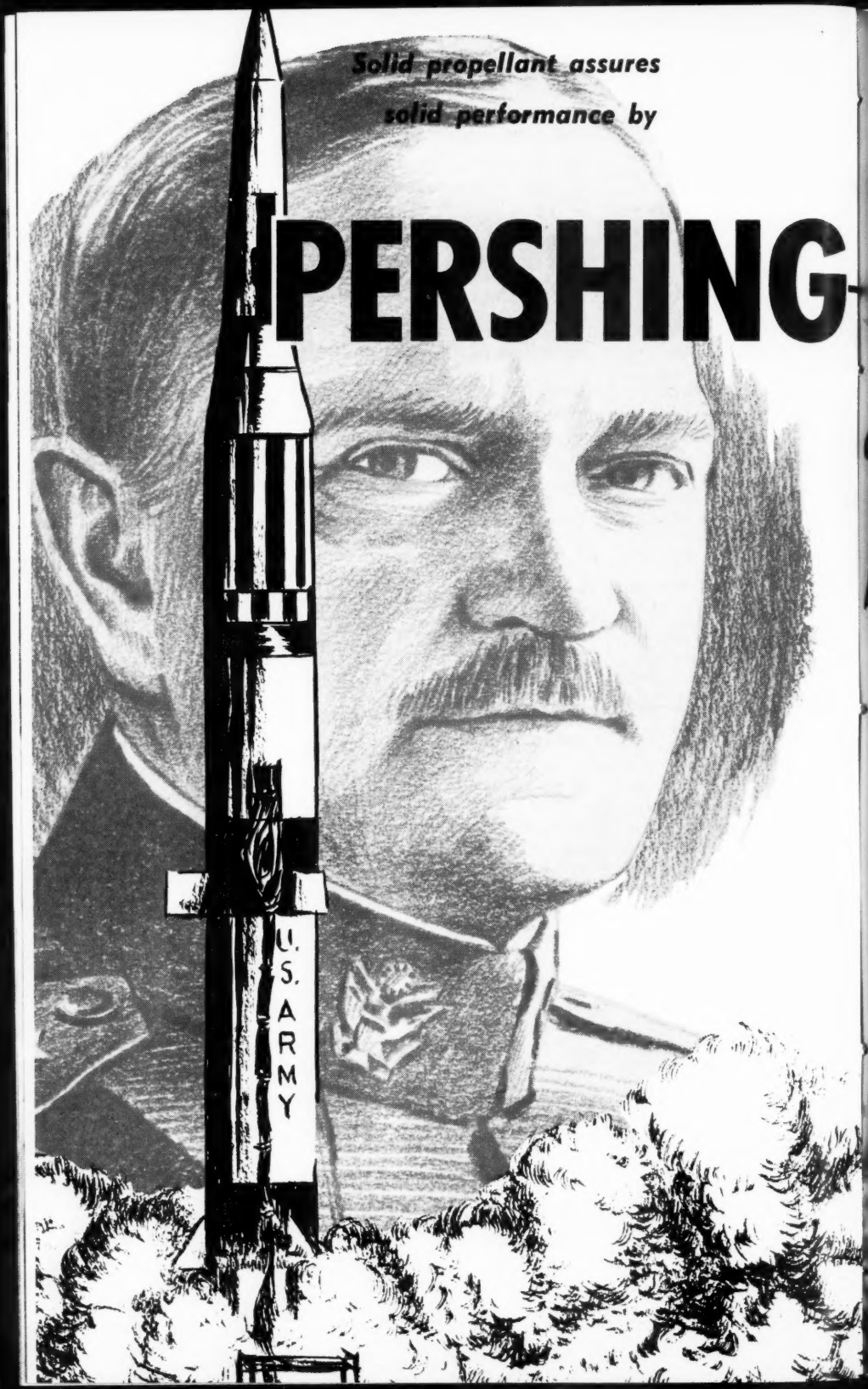

Solid propellant assures
solid performance by
PERSHING
U.S. ARMY

The Army's Four-Star Missile

★ accurate
★ mobile
★ reliable
★ simple

Brigadier General Richard M. Hurst

THROUGHOUT the history of warfare, firepower and mobility have leap-frogged each other in producing new weapons and new techniques.

Sometime during the dim past, the club-wielding warrior mounted a horse to gain an advantage of mobility over his foot-borne adversary.

The invention of the bow and arrow took away some of that advantage. Later came gunpowder and a more effective equalizer.

With the 20th century and the invention of the airplane came anti-aircraft guns, aerial bombs and long-range striking power, used both in strategic bombing and airlifting of soldiers and equipment.

Giant steps in mobility and firepower were recorded in the years following World War II. With the advent of the Atomic Age, massing of troops became less desirable, while the need for long-range ground mobility increased proportionately with the destructive power of nuclear weapons.

Weapons had to be small enough to handle easily under combat conditions, yet large enough to carry the

type of explosive desired over a greatly increased range. Supporting equipment also had to be compact and mobile, even though the increased range and firepower made the weapon system more complex.

Instead of firepower leap-frogging mobility, or vice-versa, the Army needed a sizable advance in both, combined in the same weapon.

The opportunity for such an advance came early in 1958.

ABMA Gets the Job

ADVANCES in solid propellant technology made it possible for Secretary of Defense Neil H. McElroy to announce, on 10 January 1958, that the Army had been authorized and directed to proceed immediately on a top-priority basis with development of a solid-propellant ballistic missile to replace the operational Redstone.

Redstone, a 200-mile, liquid propellant, ballistic missile, had enjoyed outstanding success in its development phase. Originally developed by the experienced team of scientists at the Army Ballistic Missile Agency (ABMA), it had played a major role in America's early space programs and, early in 1958, it was made a part of the allied shield in Western Europe.

In giving the "go-ahead" for the new missile, Secretary McElroy stated the need for a missile "smaller, lighter and even more mobile than the Redstone."

The choice of ABMA as the agency to do the job was well-founded. Its scientists, engineers, and technicians had proved themselves with their highly successful Redstone and Jupiter missiles. The experience gained in these two programs formed a broad, solid base upon which to build still another successful program. Heading the team of ABMA missile experts assigned to the Pershing project was Dr. Arthur Rudolph, a pioneer with over 30 years experience in rocketry.

Detailed requirements for the Pershing called for a system relatively simple in operation—one that would provide maximum firepower coupled with maximum mobility, capable of operating in all kinds of weather and terrain. It also had to be operational as soon as possible.

Pershing System

AS NOW developed, the 34-foot Pershing is a solid-propellant, two-stage ballistic missile of selective range designed to support the field Army. The entire system is transportable on the XM-474 prime mover, a fully-tracked modification of the M-113 armored personnel carrier. It is also air-transportable by helicopter and fixed-wing aircraft.

The Pershing is designed to go anywhere with the field Army and destroy any target within the commander's assigned mission. Its major items of ground support equipment are the XM-474 and the transporter-erector-launcher (TEL).

Brigadier General Richard M. Hurst
Commanding General
U. S. Army Ballistic Missile Agency
Redstone Arsenal, Alabama

Capable of moving on land or by aircraft, Pershing is highly mobile ballistic missile in U. S. arsenal.

TEL serves as a carrier for the missile when mounted on the prime mover; it erects the missile into its firing position, and supports it accurately at the proper azimuth until the missile is fired. The Pershing is normally fired with the TEL mounted on the XM-474, but it can also be fired from the TEL alone. The rubber-wheeled TEL can be maneuvered into firing position after removal from the XM-474 prime mover.

The erector portion of the TEL is a dual-track mechanism supported on the transporter chassis. The launching platform is mounted at the rear of the transporter and is pivoted so it can be rotated to the ground, where it is supported by leveling jacks. During transport, the missile is carried in a horizontal position on the erector, which is also pivoted at the rear of the transporter.

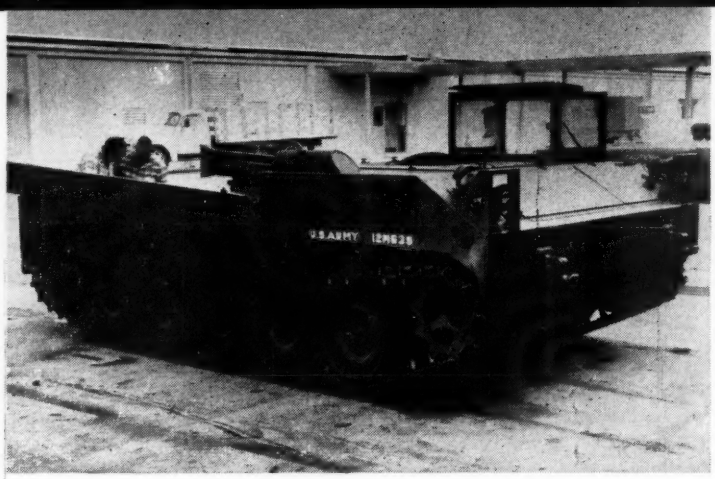
At the firing site, after the launch platform is lowered to the ground and leveled, the erector rises to the vertical position, placing the missile on the launcher. The erector then returns to the horizontal position, leaving the missile resting in a vertical position on the azimuth ring of the launcher. Under command of the fire control unit, the azimuth position of the missile is adjusted accurately before firing.

Control cables and high pressure air lines necessary to check out and fire the missile are mounted in a cable mast. The lower end of this cable mast is mounted in a bracket attached to the launcher azimuth ring, while the upper end is engaged with electrical and air connections in the missile. Just prior to ignition, the upper end of the cable mast is automatically ejected from engagement with the missile.

One of the features of the TEL is that the cable mast can be used repeatedly. The upper end of the mast is ejected from the missile a sufficient distance to provide clearance for firing; a brake then quickly stops movement of the mast and holds it in a near vertical position, to prevent any damage to the mast.

The XM-474 prime mover is a lightweight, low silhouette vehicle designed to load and transport all portions of the Pershing system. Of about 11,000 pounds gross weight, it is 205 inches long, 73 inches high, 100 inches wide, and has a ground clearance of 16 inches. The XM-474 can ford through 42 inches of water and it can travel on improved roads at speeds of about 40 miles per hour. The vehicle can negotiate a side slope of 30 degrees and a forward or reverse slope of 60 degrees.

Test and checkout equipment, contained in a fire control hut, is also



Major item of ground handling equipment is fully tracked XM-474, a modification of M-113 personnel carrier.

transported on an XM-474. The equipment is used in prefiring checkout, to isolate faults within the missile and ground equipment, and to monitor the pre-launch countdown sequence. The portable remote fire control box, with which the missile is fired, is also part of this equipment.

An outstanding feature of the Pershing's portable communications equipment is its self-contained, inflatable antenna. This space-saver folds compactly into the communications hut during travel and is quickly inflated to 8-foot diameter at the firing position.

The inertial guidance system for the Pershing is an advancement of the highly successful systems used by the ABMA-developed Jupiter and the Redstone. Like most elements of the Pershing system, the guidance package is smaller than in the Jupiter and Redstone, but is believed to be even more accurate than its predecessors.

Army-Industry Teamwork

WHEREAS the Redstone and Jupiter were developed "in-house" by ABMA, the Pershing development program has been a well-coordinated effort between the Army and industrial contractors.

The Martin Company of Orlando, Florida, was placed under contract as prime contractor for the system on 25 March 1958. Since then, every move has been made as a carefully planned part of an overall program to provide a complete weapon system at the earliest possible date. This is being done without sacrifice to the system's efficiency, thanks to the close relationship maintained by ABMA with contractor personnel.

Sub-contractors and their responsibilities include: TAPCO Division of the Thompson-Ramo-Woolridge Company, Cleveland, Ohio, manufacturer of the transporter-erector-launcher; Eclipse-Pioneer Division of the Bendix Corporation, Teterboro, New Jersey, inertial guidance stable platform and associated equipment; Bulova Watch Company, Long Island, New York, fuzing and arming system; Thiokol Chemical Corporation, Huntsville, Alabama, design and development of the propulsion system.

The Food Machinery and Chemical Corporation, San Jose, California, in coordination with the Army Ordnance Tank-Automotive Command in Detroit, Michigan, is responsible for the XM-474 prime mover.

Communications equipment for Pershing has been developed by Collins Radio Company of Dallas, Texas, in coordination with the Army Signal Corps.

Others engaged in the Pershing program include the Army Ordnance, Transportation, and Quartermaster Corps, and the Corps of Engineers.

Technical supervision of all contractor activities remains with ABMA.

Under this integrated and coordinated development program, each element is working to provide a system geared to the rigorous, flexible demands of combat. The entire program is animated by the need to provide effective, modern weapons for our soldiers in the minimum amount of time.

Development Program

EARLY phases of the Pershing development program were conducted with one over-riding thought—it is easier to make corrections on the ground than in the air.

Because of this emphasis on ground testing of components, the Pershing set a Cape Canaveral record by achieving successes in each of its early firings down the Atlantic Missile Range.

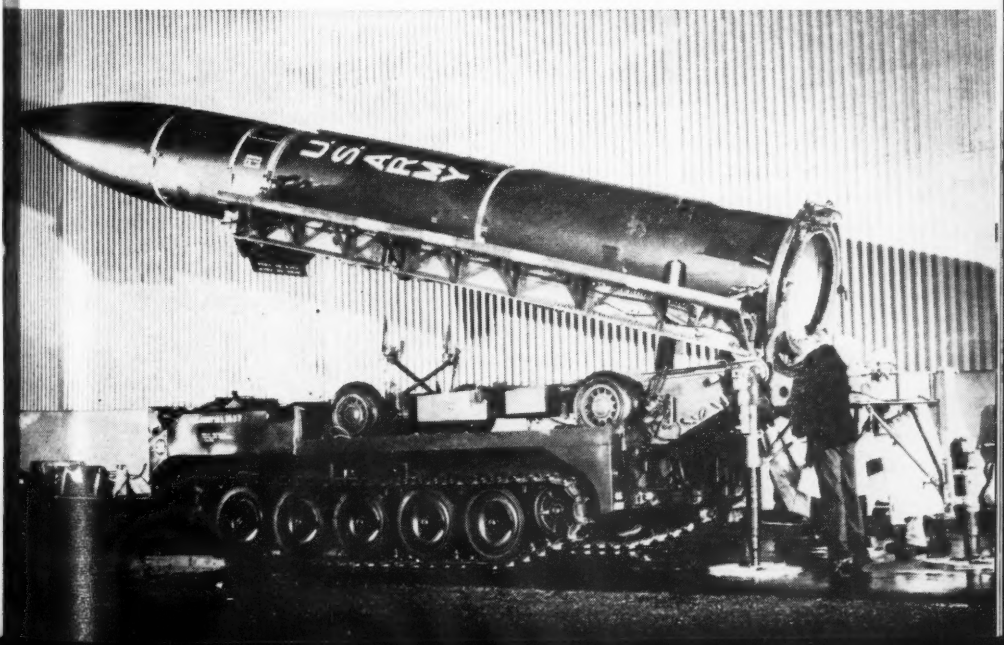
Many different laboratory tests of equipment and parts were conducted before the first firing tests at Cape Canaveral. Suggested modifications were thoroughly tested before introducing them into the missile.

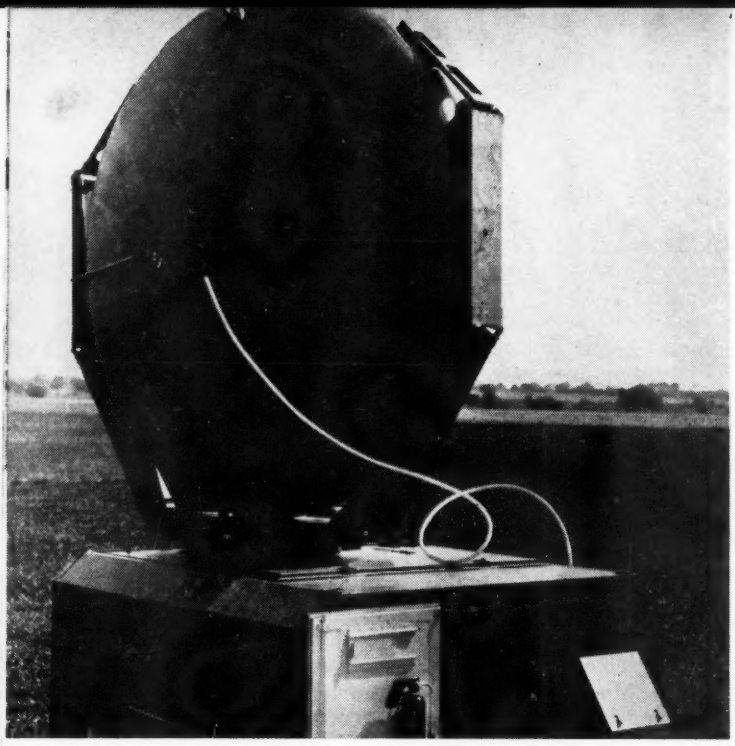
Among the more significant tests were those centered around the second stage of the missile. In previous firings with solid propellant motors, missilemen had encountered a separation of the bonding between the propellant and the motor cases. Such a separation could cause a serious malfunction during the powered portion of a missile's trajectory.

Changes were recommended to minimize this possibility in the Pershing. A modified second-stage motor case was "spin-tested" at high speeds on a centrifuge, and it was determined that the recommendations were sound.

Another outstanding feature of the ground-test program was the use of a high-altitude simulator. Built by Watertown Arsenal to ABMA specifications, the simulator made possible test-firings of the second stage under atmospheric conditions equivalent to those that would be encountered along its trajectory. Here again, calculations covered every possible condition to which the missile might be subjected during firing tests.

An early configuration of the missile, used in early tests, is mounted on the XM-474 and its transporter-erector-launcher. It also may be fired from the TEL.





Extremely compact communications equipment such as inflatable antenna makes for great simplicity, reliability.

Captive sequential firings of both stages also were conducted at Redstone prior to tests at Cape Canaveral. In these tests, a first-stage motor with dummy second stage and warhead was set up on one of the vertical test stands, while a live second stage with a complete guidance section and dummy warhead was installed on another stand.

The Pershing's guidance section controlled both parts of the tested missile, activating the second-stage motor after burnout of the first. Missile guidance and control functions were simulated to represent an actual firing test, except that in the captive tests the missiles were subjected to even more strenuous requirements than would be met during an actual firing.

Instrumentation recorded data on temperature, vibration, stress, strain and other factors to compile information on the missile's performance. Besides helping to insure early success in the test program at Cape Canaveral, these tests effected significant savings in time and money.

Missile Firing Program

THE first test of the Pershing over a ballistic trajectory was conducted at Cape Canaveral on 25 February 1960 —less than two years after the first contract was signed.

In the initial test program, only the first stage of the missile was fired. The second stage and the warhead unit were weighted to equal the weight of the missile with a full component load. Range was not an objective in these early tests; rather, interest was centered on the operation of the first stage.

Overall, the research and development firing record of Pershing is a highly successful one. As these tests proceed, more difficult and complex tasks will be undertaken in order to qualify Pershing for its important role in Army weaponry.

Troop Training Aspects

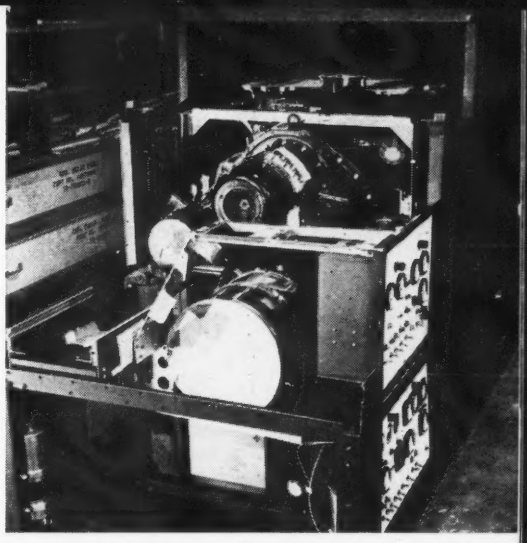
ROUNDING out its integrated Pershing development program, the Army already has begun training key personnel. In September 1960, the first course of instruction on Pershing was opened at the Army Ordnance Guided Missile School at Redstone Arsenal, Huntsville, Alabama. The first class was composed of 40 selected individuals from agencies which will be responsible for supervising the system through manufacture, maintenance, personnel training and deployment.

Several advanced techniques are being used to make the instruction realistic, informative, and interesting. These include video tapes of firing procedures taken at Cape Canaveral, closed circuit television, and charts animated by "technamation," a polarized light effect. (See "Teaching Missilemen," May 1960 DIGEST.)

Proud Name—Proud Record

WHILE Pershing is still in the development stage, some items have been committed to small-scale production to check out production facilities and verify pre-production planning.

For example, in December 1960 the Thiokol Chemical Corporation received a contract for procurement of motor cases and other parts. These components will be utilized in the production version of the Pershing motors to be manufactured at the corporation's Longhorn Division in Marshall, Texas.



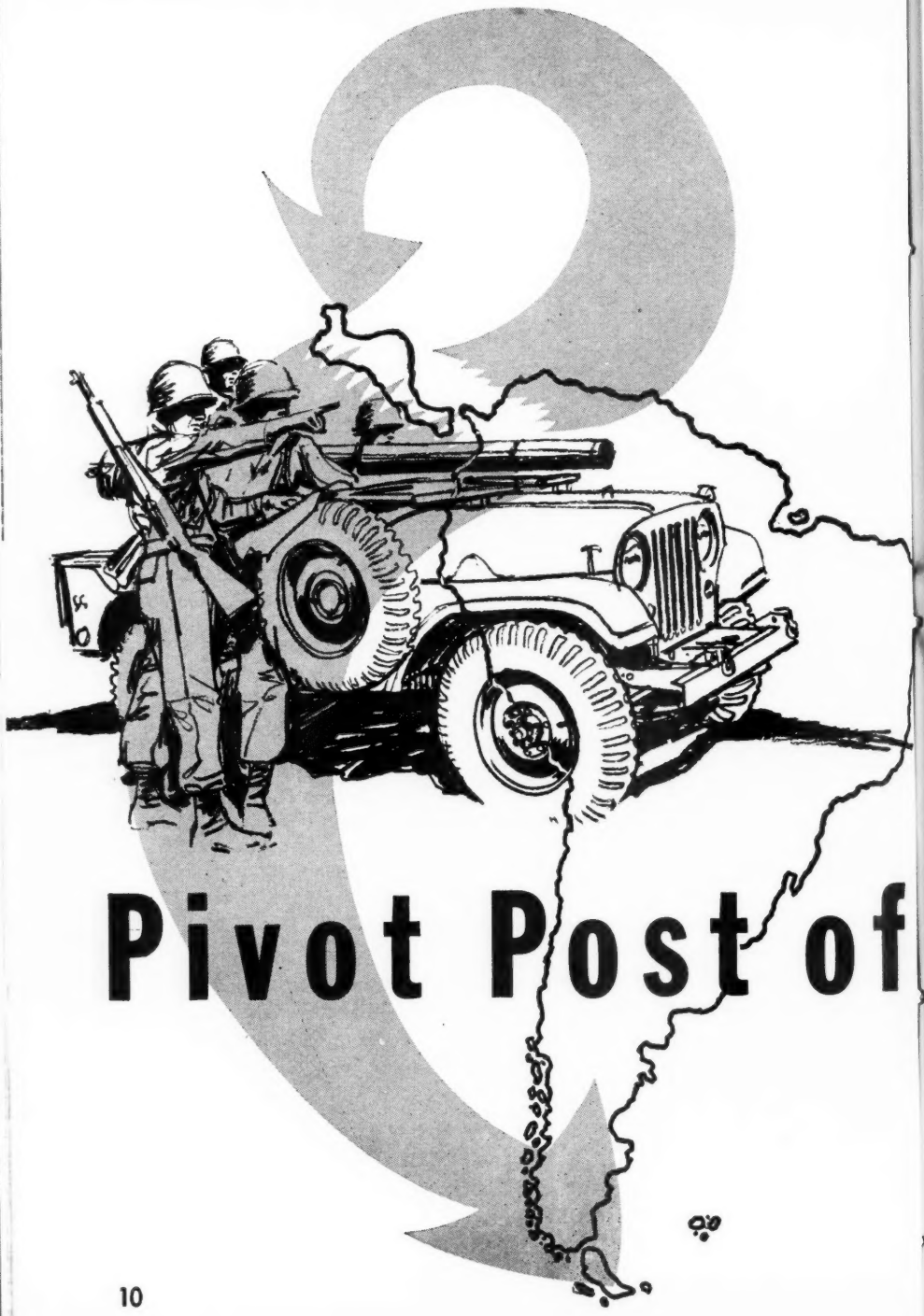
The self-contained power pack of Pershing, shown here with cover removed, facilitates cross-country movement.

WITH its development program progressing satisfactorily and on schedule, the Army is extremely proud of the record which the Pershing is setting. For the Pershing has taken more than a name from its namesake, General of the Armies John J. Pershing. It, too, is establishing a proud record and is expected to demonstrate those qualities of reliability and strength which were characteristic of the General himself.

Continuing within its present pattern of development, the Pershing missile will soon become an outstanding addition to America's arsenal of defense weapons—accurate, mobile, reliable, simple and ever ready to meet any challenge to the armies of the Free World.

Firing platform, shown in lowered position, is integral part of the missile's transporter-erector-launcher.

U. S. Caribbean Command—



Pivot Post of

Hemisphere Defense

Lieutenant General Robert F. Sink, USA-Ret.

EVER since 1914, when the Panama Canal was pushed to completion by the Army Engineers as an interoceanic waterway for all the world's shipping, the U. S. Army has maintained its vigil over this strategic "big ditch" and its approaches. In 1914 a provost marshal's camp was established on the ledges of Ancon Hill, and two years later a permanent Army post was located there, dubbed Quarry Heights.

From its very beginning, the Post of Quarry Heights has been the seat of the highest military headquarters in the Canal Zone. Today it houses the Caribbean Command (CARIBCOM), and from his office on the Heights the Commander in Chief Caribbean (CINCARIB) can look down on the Pacific entrance to the Canal, which serves as a constant, visible reminder of one of the missions assigned to his command—protect the Panama Canal.

However, not all of the Command's responsibilities lie on the headquarters doorstep. Northward, the Command's concern emanates from the Canal Zone, follows the narrow Isthmus of Panama through the swamps, over the mountains, and across the valleys through Central America until it reaches Mexico's southern border.

In the opposite direction its area of interest spreads over all of South America, reaching from the tropics to Tierra del Fuego, Land of Fire, where the continent narrows gradually until it juts into Antarctic seas.

This widespread responsibility is indicated in the simple wording of some of CARIBCOM's tasks:

- conduct search and rescue operations within the Caribbean area;
- provide military support as available for disaster relief operations in Latin America;
- provide direction to the U. S. military missions in Latin American countries;
- plan for and administer the Military Assistance Program throughout the Latin America area; and
- train Latin American armed forces personnel in facilities in the Canal Zone.

The unity needed to accomplish these objectives is evident each day at Quarry Heights as U. S. Navy

officers and sailors rub shoulders with Air Force officers and airmen, and all of these mingle with Army personnel assigned to the headquarters.

Under command of an Army lieutenant general, this unified Headquarters serves as the directing authority in operations of its three component forces: U. S. Army Caribbean (USARCARIB), Caribbean Air Command (CAIRC), and the 15th Naval District (15ND). This provides direct control of operational forces available for employment under the Joint Chiefs of Staff. The component commands retain a channel to their Service Chiefs in single-service matters of administration, personnel and logistics.

Two of these component commands —Army and Navy—have headquarters at Fort Amador, so near that their buildings can be seen from Quarry Heights. The Air Force makes its home at Albrook Air Force Base, about two miles away, hidden from Quarry Heights only by the vegetation on the lower side of Ancon Hill.

Army Mission

U. S. ARMY Caribbean has a fivefold mission that it directs from Fort Amador. Under Major General Theodore F. Bogart, USARCARIB trains its own units for combat operations, promotes friendly relations with Latin American countries, assists them in mutual defense of the hemisphere, provides protection for the Canal Zone and USARCARIB bases, and is the primary U. S. Army agency for increasing proficiency in jungle war.

Two Infantry battle groups provide ground defense for the Zone—the 1st Battle Group, 20th Infantry and the 2d Battle Group, 10th Infantry.

The 1st Battle Group makes its home at Fort Kobbe on the Pacific side of the Isthmus, across the canal from Caribbean Command headquarters. Officers and men of this organization earned their right to the title of "veteran" in November 1959 when they were called upon to face jeering mobs of rioters, egged on by Leftist troublemakers.

Attached to the 1st Battle Group are B Battery, 22d Artillery, a field artillery battery armed with 105mm howitzers; D Company, 34th Armor, equipped with M-41 tanks; and the 518th Engineer Combat Company.

The 2d Battle Group, 10th Infantry, formed as recently as April 1960, is stationed at Fort Davis on the Atlantic side, with the exception of one company, which is located at Fort Sherman in support of the Army Jungle Warfare Training Center.

Antiaircraft defense of the Canal, until last fall, was supplied by an antiaircraft artillery battalion armed with 120mm, 90mm, and 40mm weapons. In September 1960, however, new air protection was added with the arrival of two Hawk missile batteries to replace the 90's and 120's. Battery D, one of these Homing-All-the-Way-Killer outfits, went to the Atlantic side

LIEUTENANT GENERAL ROBERT F. SINK was Commander in Chief, Caribbean, until his retirement in February. He has been succeeded by LIEUTENANT GENERAL ANDREW P. O'MEARA.

With earth still scarred from building operations, Quarry Heights in 1915, left, was a far cry from pleasantly landscaped home, right, of Caribbean Command today.

to join A Battery; the other, Battery C, joined B Battery on the Pacific side. Together all four units now comprise the 4th Missile Battalion (HAWK-AW), 517th Artillery.

Diversified Training

TRAINING is a watchword with USARCARIB and it extends far beyond the day-to-day routine of the two battle groups. At Fort Sherman, for example, the Army operates the Jungle Warfare Training Center. To this school come not only troops stationed in the Zone but U. S. Army personnel from continental United States, sent here to maintain their jungle warfare capability, and Latin American trainees as well. Not all JWTC graduates are soldiers, either. Some of the Navy's highly trained frogmen have become jungle experts in training at Fort Sherman, as have members of the United States Marine Corps.

A military jungle laboratory is maintained at the same site. Here armaments and tactics are under constant study to develop new techniques of jungle fighting.

Pathways to Solidarity

ONE of the main objectives of the Caribbean Command is to improve Western Hemisphere defense solidarity and, by so doing, to increase understanding and good will between the United States and the countries of Central and South America.

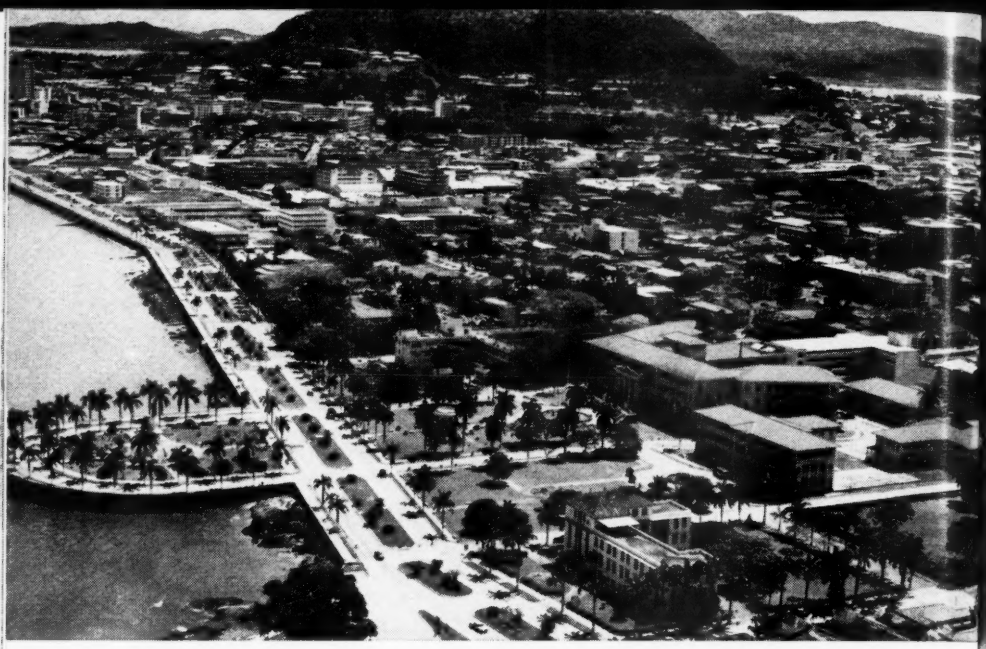
These ends are accomplished by various means. In one method, the Latin Americans come to the Zone where, at Fort Gulick and at Albrook Air Force Base, they receive invaluable training.

At Fort Gulick the visiting military students study at the USARCARIB School, founded in 1949 to give tactical and technical training to Latin American officers, cadets and enlisted men. Instruction is conducted by bilingual members of the U. S. Army.

A recent addition to the USARCARIB School curriculum is the Field Grade Officers' Course. This course attracts senior officers who could not attend U. S. Army service schools in the United States because of lack of fluency in English but who are nonetheless eligible for the same high level schooling in tactics and strategy.

The influence of the school is augmented by periodic visits of staff member teams to Latin American countries. Besides staging demonstrations for those who have not been able to attend the School, they keep School graduates current on new equipment and techniques.

The Caribbean Air Command also operates a school for Latin Americans. Geared especially to Air Force instruction, this School for Latin America, as it is called, teaches



From Ancon Hill overlooking Panama City, the Commander in Chief Caribbean can see Panama entrance of the Canal—a constant reminder of his command's mission.

courses in 17 technical fields to students from 14 republics.

Although officially established in 1947, the school had its beginnings in World War II days when a group of twenty Peruvian airmen, at the request of their government, began on-the-job technical training at Albrook Air Force Base. This type of training was continued for the succeeding five years until formal establishment of the school.

Albrook AFB also houses another training center where airmen of the various services learn to live off the land in the tropics. This Tropic Survival School is literally a "life-saver" for flying men who may one day find themselves down in the midst of a jungle.

However, the entire task of the Caribbean Command could never be accomplished by the one-way method of having Latin Americans come to the Canal Zone. Accordingly, the Command reaches out into Central and South America with a helping hand wherever it is needed.

For example, the Inter-American Geodetic Survey (IAGS), a separate command of USARCARIB which makes its headquarters at Fort Clayton in the Canal Zone, supports field projects in 13 Latin American countries. Composed mostly of civilians and administered by the U. S. Army Corps of Engineers, IAGS covers some seven million square miles.

Under mapping agreements made by the State Department in 1946, IAGS lends equipment and, in special cases, furnishes technical personnel and conducts certain cartographic operations in Latin American nations that are not yet able to conduct their own. Normally, though, most of the work is done by Latin American mapping agencies with IAGS civilian engineers furnishing training on the job and acting as advisers.

Although the ultimate objective of this vast project is a coordinated map of the Western Hemisphere, the goodwill generated between Latin America and the United States is an important by-product.

Aid in Disaster

THE full reach of CARIBCOM extends into Central and South America through the operation of the Military Assistance Program and via the component commands through the work of the Army, Navy, and Air Force Missions. Personnel of the Missions "double in brass" to carry out the functions of the MAP, with the chiefs of the Military Assistance Advisory Groups (MAAG) in each country responsible to CINCARIB.

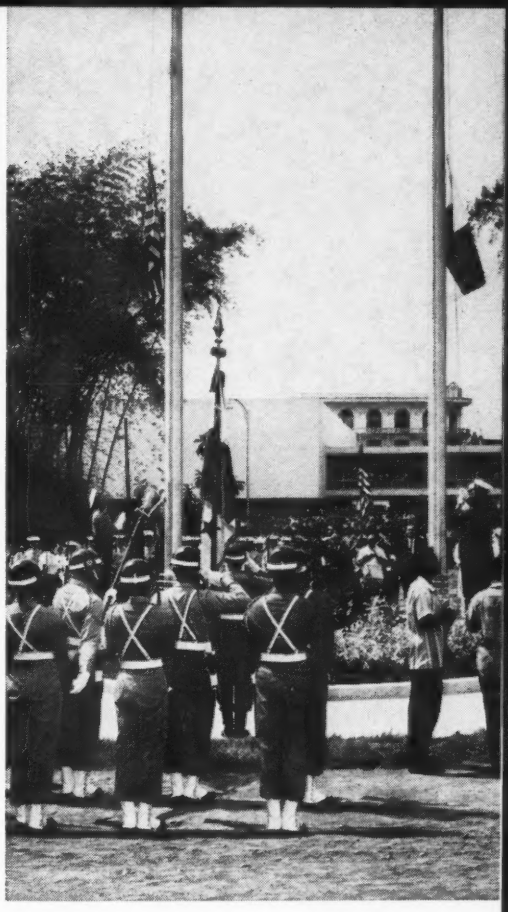
For instance, the 15th Naval District—smallest of Caribbean Command's three components—provides logistic support, medical services, and temporary housing in the Canal Zone to eight U. S. Navy missions located throughout South America. The Caribbean Command has at least one military mission or MAAG operating in all countries of Central and South America except Mexico, British Honduras, the British and French Guianas and Surinam (old Dutch Guiana). Although a mission is maintained in Haiti, there are no missions assigned to Cuba, Dominican Republic or the West Indies Federation.

Members of these units are close to the heart of each nation's problems and live with the host country population as friends and neighbors. Aside from their normal duties as military advisors, in time of disaster their presence and familiarity with the local scene have proven invaluable in relief operations.

It was only last May, when southern Chile was devastated by floods and tidal waves, with thousands left hungry, destitute and homeless at the beginning of a Southern Hemisphere winter, that this fact was pointed up most significantly.

When the 6,000-mile air bridge that came to be known as Amigos Airlift reached Chile from the United States, Military Air Transport Service crews found MAAG personnel on the spot, waiting to meet them, with relief procedures already well organized. At the time of the disaster, MAAG members made instant appraisals of the situation. They established vital and primary needs on-the-spot, co-ordinated with Chilean authorities, and started a flow of valuable information back to the States through the Caribbean Command nerve center.

When the last of the 84 planes of the gigantic airlift headed northward from Chile, they left behind two Army field hospitals, two helicopter ambulance units, a water purification team, and various small technical units under the guidance of MAAG personnel. Weeks later, when their emergency services were no longer



On historic occasion, flags of U. S. and Panama rise on twin staffs to mark first time Panamanian flag was hoisted in Zone.

"Southern Cross" heading for the Pacific is lowered 31 feet to Miraflores Lake as it passes through Pedro Miguel locks.

required, members of the tri-service MAAG once more turned attention toward their normal task of rendering military assistance and advice.

The Chilean disaster also served as a reminder of another great portion of the Caribbean Command mission—to provide military support for disaster relief operations in Latin America. Plans are continually being made, revised and kept up to date in the unified command headquarters, with the hope that they will never have to be used. But if the occasion ever does arise, such advance planning will be invaluable—and appreciated.

These plans recognize that disasters come in various sizes. The Chilean disaster was on a regional scale, but in smaller ones as well, Latin Americans have learned the greatness of heart of the people of the United States.

Less than six months before the Chilean disaster, another earthquake struck Arequipa, a Peruvian city of 90,000. Within hours, the Caribbean Command had marshaled tents, food, blankets, and medical supplies for the affected Andean area.

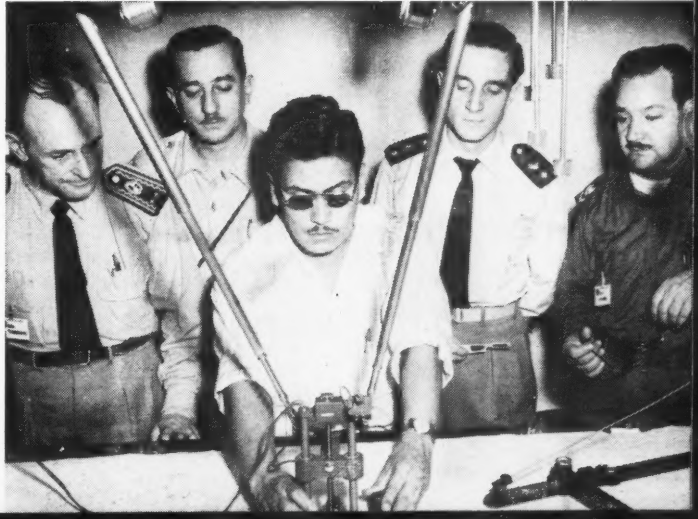
Last spring a mental asylum fire in

Peaceful picture of cruise ship *"Reina del Mar"* passing through famed Gaillard Cut illustrates reason for establishment of Caribbean Command—to protect the Canal.

Officers of the Air Forces of United States, Chile, Peru plan an air strike against Aggressor forces attempting to "seize" Canal during Operation Banyan Tree II.

Guatemala City, Guatemala, left survivors without shelter and necessities at the same time that tropical hurricane Abby was moving in near neighboring Honduras. In answer to the emergency, two U. S. Air Force C-54 transports of CAIRC took off from Albrook AFB, carrying 27,000 pounds of Army medicines, bedding, and clothing. Flying through poor weather, they delivered their cargo to Guatemala City, unloaded in record time, and took off just ahead of Hurricane Abby's slashing winds and rain.

Only recently a Spanish priest serving as an island missionary to the San Blas Indians was seriously injured on a building project. A Baptist missionary communicated with an amateur radio operator in the Canal Zone, who relayed the news to Panamanian authorities. A formal request from them to the U. S. Embassy resulted in a phone call to the duty officer at Quarry Heights. That dawn found a helicopter on the way to lift the injured priest out of the jungle. The helicopter was met by a C-47 transport at



Latin-American army officers train at the Cartographic School on Inter American Geodetic Survey in Zone.

Aggressors from U. S. Army Caribbean build up a firing line against assaulting forces flown in from Fort Bragg joined with troops from Brazil, Colombia, Panama.

the nearest landing strip and the injured cleric was rushed to Panama and medical aid.

Mercy missions and disaster relief operations have been so numerous over the past years that they often are accomplished as a matter of routine. Yet their importance as makers of friends is never forgotten.

While carrying on wide-ranging activities throughout Latin America, members of the Command never lose sight of the fact that the majority of them live side by side with the citizens of the Republic of Panama.

To offset the confusion-producing tactics of a few local troublemakers which had strained personal relations between Caribbean Command members and their Panamanian neighbors, USARCARIB under Major General Theodore F. Bogart launched a program called Operation Friendship.

With the full approval of the Commander in Chief, Caribbean and Major General William A. Carter, Governor of the Canal Zone, Operation Friendship was immediately endorsed by both Major General Leland S. Stranathan's Caribbean Air Command and Rear Admiral Richard S. Craighill's 15th Naval District.

As a result, more military men in the Canal Zone than ever before are joining in Spanish language classes. Tours take them to Panama, where they are introduced to native culture, historical landmarks, and the Panamanian Presidencia, known as the "Palace of Herons." Sports enthusiasts from both sides of the border meet in the Canal Zone and in Panama to compete in swimming, baseball games and other athletic events.

The success of the program became apparent when an appeal for blood donors was issued by the Republic of Panama. The list was over-suscribed, and one of the first names on it was that of General Bogart.

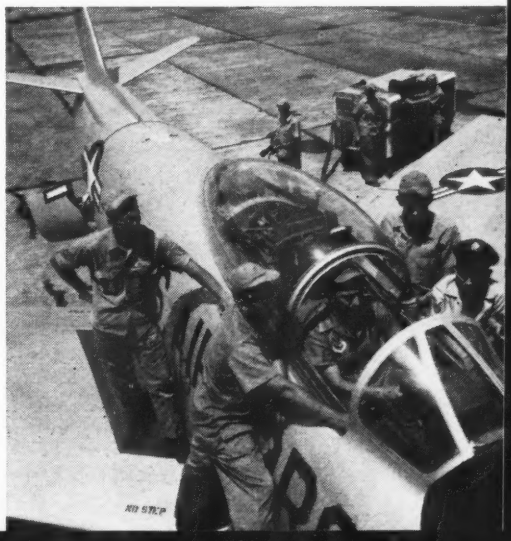
Addition of two Hawk missile batteries has increased air defense potential of the Command throughout the Zone.

The value of Latin American friendship to the mission of the Caribbean Command was graphically demonstrated in spring 1960 during a training exercise at Rio Hato in the Republic of Panama. Dubbed Banyan Tree II, the exercise brought troops from the United States, Brazil, Colombia, Chile and Peru by air to aid the United States forces already in the Canal Zone and the Republic of Panama's National Guard against theoretical Aggressor forces threatening the security of the Canal.

During the nine days of Banyan Tree II, 5000 fighting men of the six American republics developed a regard for each others' mutual abilities they had never known before. With the completion of the exercise, a new chapter had been written in the story of inter-American relations and a new page had been added to the Caribbean Command's record in fulfilling its vital mission as a pivot point of hemisphere defense.

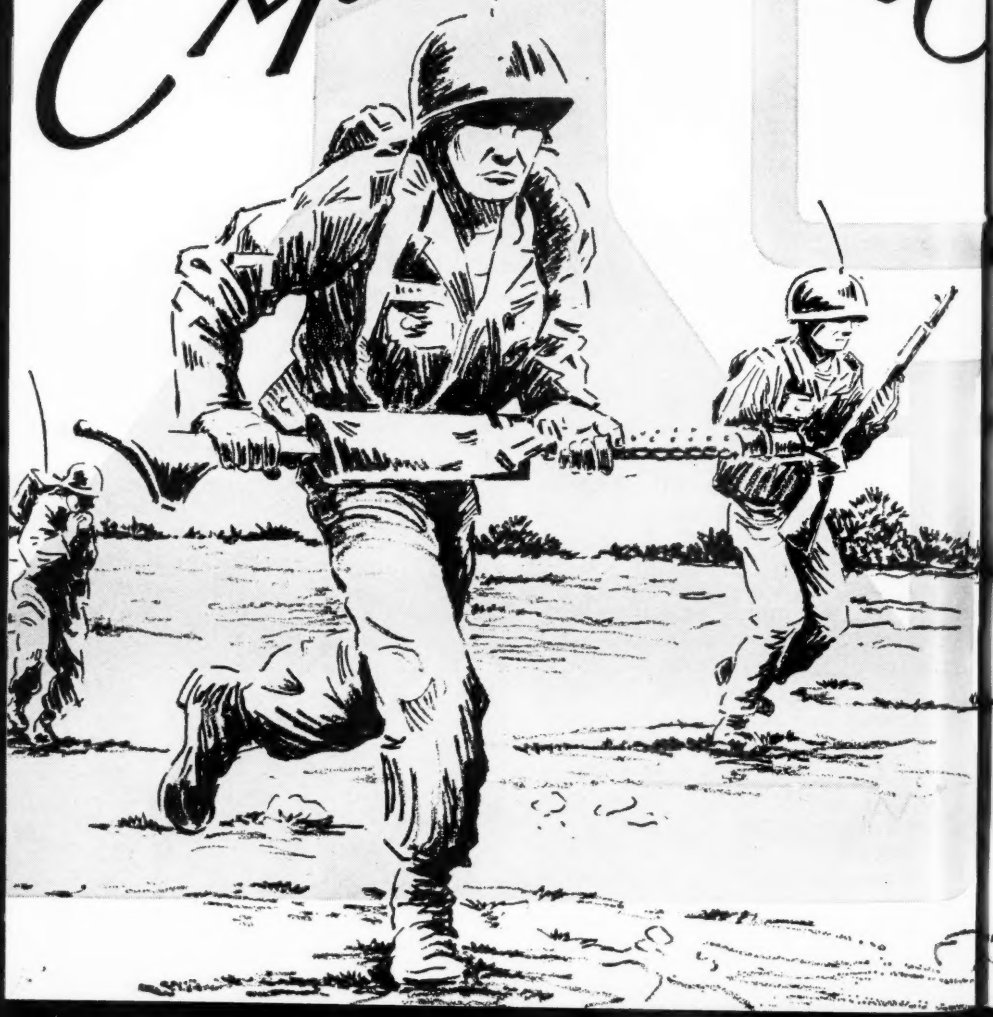
Success of Banyan Tree has prompted energetic planning for more of these mutually beneficial inter-American undertakings. The Caribbean Command shares the confidence of its Hemisphere partners that harmony, solidarity against aggression and mutual assistance are essential ingredients in the preservation of Western Hemisphere security.

Maintenance and crew chief procedures are taught at U. S. Air Force School for Latin America, located at Albrook AFB.



Combat concepts get a thorough checkout at this unique field laboratory where

Today's Experiment



Develops Tomorrow's Army

Brigadier General Charles S. D'Orsa

THE future of the United States Army on the battlefield of tomorrow is no longer being left to chance, fate, or the fortunes of war. With the advent of complex and advanced weaponry and supersonic means of delivery, the Army can no longer wait for the first shot to be fired before it begins revitalizing its concepts and tactics, producing the required weapons and equipment, and trainng its fighting force to be equal to the demands of future warfare—limited or unlimited.

In order to survive and win, the Army must be able to forecast accurately the most favorable combination of possible tactics, weapons, and equipment, ten or more years in the future. The need to look this far ahead is not a matter of choice but of necessity if we are to stay ahead of any possible enemy in the technological race.

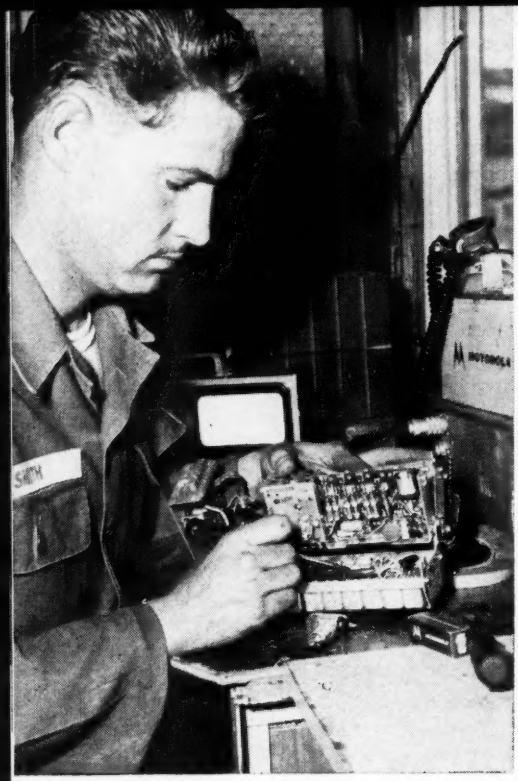
Logic and imagination must produce the theories and concepts for future warfare and these theories must then be tested and proven. Test results lead to changes and improvement in the theory, and the new theory, in turn, may then be retested.

Only by coordinating the development of theories with a parallel program of experimental examination can we accurately forecast and design today the best possible army for tomorrow. To this end the Army's Combat Development System was established in 1952. Responsibility for its monitorship was assigned to the Commanding General, United States Continental Army Command (CONARC).

The Combat Development System envisions a program of broad responsibility and wide freedom of action for the development and evaluation of new concepts of organizations, weapons, tactics and techniques, and their synthesis into an effective fighting force. Today more than twenty-five schools, boards and other agencies, along with the Combat Development Experimentation Center (CDEC) comprise the system that is implementing this development and evaluation program for the U.S. Army.

Experiment Center

IN RECOGNITION that essential field experimentation for a future fighting force should be separated from normal troop training and field exercises, CDEC, one of the latest additions to the Combat Development System, was activated at Ford Ord in 1956. CDEC was given the unique mission of serving as a field laboratory for the evaluation, by objective experimentation, of concepts of or-



Radios used by experimentation troops of CDEC are tested to insure continuous contact with umpire control center.

ganization and operations, both tactical and administrative, developed by the several agencies of the Combat Development System as directed by Headquarters, U. S. Continental Army Command.

In pursuit of these goals, CDEC during the past four years has conducted eight major experiments and a number of contributory tests involving various unit organizations and tactical operations from squad level through the battle group. It has examined a gamut of supporting activities from Davy Crockett to field army logistics. Basic concepts have been subjected to scrutiny. In addition, much has been learned about experiment procedures.

CDEC's first experiment, Umpire Procedures and Techniques, dealt entirely with methods and mechanics of field experimentation. The results, progressively refined, form the foundation upon which to base experimentation operations in the field.

Concepts within the Pentana planning philosophy, beginning at squad level and progressing through examination of selected aspects of the Integrated Combat Group, have been analyzed to produce information and data useful in modifying and improving the Pentomic concept. In addition, strengths and weaknesses demonstrated in this experimentation were reflected in development of later planning philosophy.

Two experiments reflecting new concepts of organization have already been conducted. Essentially these involved comparisons of several different company-type units in a variety of combat tasks over varying types of terrain and opposed by differing aggressor forces. Logistics systems contemplated to support these concepts also were examined.

Brig. Gen. Charles S. D'Orsa
Commanding General,
U. S. Army Combat Development
Experimentation Center,
Fort Ord, California

Grid coordinate marker, one of many dotting huge field laboratory, helps eliminate error in reporting position of armored team staging assault on an Aggessor unit.

The next three currently programmed experiments, now in various stages of planning, deal with the next higher echelon. Command and control of the combat elements of a battle group sized organization is the subject area for the first of these experiments.

Two primary facets to combat are the "finding and fixing" of an enemy force, and then his destruction by the application of firepower. The ability of the commander and his forces to accomplish the "finding and fixing" of an enemy force is the currently planned subject of the next experiment, while the third is designed to evaluate the "destructiveness" of the available firepower.

In addition, other features of future

Side experiments are often staged as part of others, like this test of thermal face protective creams by tankers.

tactics—including night operations, air-mobile operations, and combat deception—will be subjected to scrutiny. Completion of these experiments and evaluations will produce data for revisions of future warfare concepts.

Organization Changes

DURING the four years since its inception as a small organization designed to conduct tactical field experimentation, CDEC has undergone more than the normal share of growing pains and changes. The most recent change entailed a complete reorganization in July 1960, making CDEC a Class I activity of CONARC with troop elements essential for experimental operations assigned directly to CONARC and in turn to the Commanding General, CDEC. This direct assignment of experimentation troops greatly facilitates the conduct of experiments by placing all administrative and operational requirements under direction and control of a single commander.*

Experimentation Staff

CONCURRENT with this reorganization, major changes were made in CDEC staff arrangements to streamline command and staff channels.

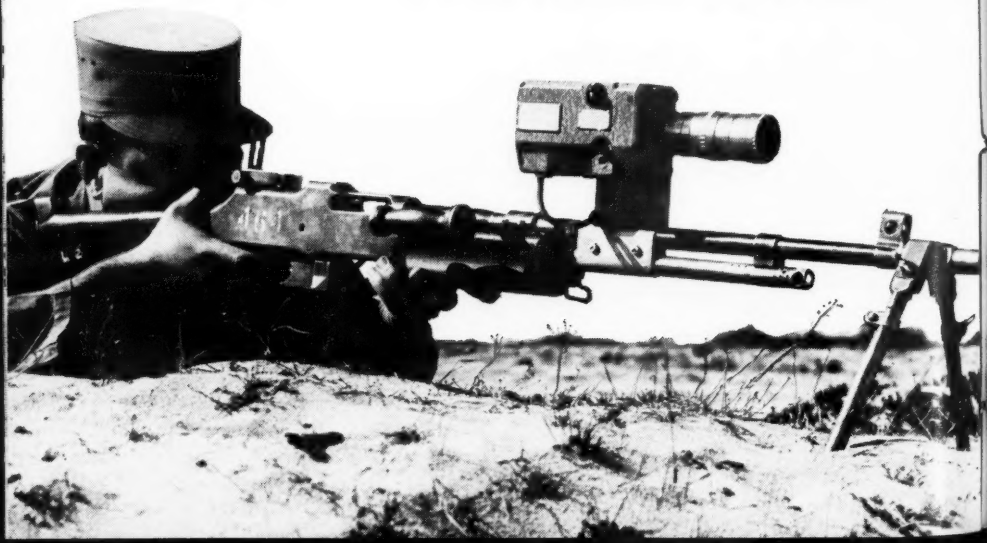
One highly important command change affected the Project Teams which have prime responsibility for planning, conduct, evaluation and reporting of an experiment. These teams now have been established as distinct and separate entities within Headquarters, CDEC, with the team chiefs reporting directly to the Commanding General. In effect, intervening directorate and staff echelons are eliminated, and CDEC Project Teams now function as provisional command headquarters directly under the Commanding General.

Scientific Support

QUALIFIED civilian scientists associated with CDEC help insure that the experimental program is scientifically designed, conducted and analyzed. This, in fact, constitutes the major difference from the normal field exer-

*Previously the experimentation troops —consisting of the augmented 1st Battle Group, 10th Infantry, the 1st Howitzer Battalion, 19th Artillery, and elements of the 2d Logistical Command—were under command of Sixth United States Army. As each experiment was put in the field, troops would be released to the operational control of CDEC, and upon completion of the experiment would again revert to Sixth Army control.

Movie camera is calibrated with bore of automatic rifle to record the true sight picture of gunner, thus evaluating effects of ground fire on low-flying aircraft.



cises, troop tests, or other means traditionally used by the Army in the solution of its problems.

CDEC's success is dependent upon the full utilization of military knowledge in combination with the skills of scientists, carefully blended to achieve set goals. To obtain the requisite scientific skills, CDEC has a group of scientists provided on a contract basis by Stanford Research Institute.

Concurrent with the CDEC reorganization last July, a reorganization of the scientific support phase was accomplished. This resulted in one significant change—the establishment of a Research Board comprised of senior scientists who are experts in their respective fields. Thus the knowledge and advice of the most experienced scientists within the Stanford Research Institute are utilized to provide the best possible coordinated planning and programming of scientific support.

Pattern of Study

THE CDEC experimentation program is developed from guidelines established by CONARC. Within these guidelines, agencies of the Combat Development System recommend the investigation of areas they deem to be critical and appropriate to field examination. Based upon these recommendations, and after consideration of factors apparent to CDEC, CONARC establishes the experimentation program.

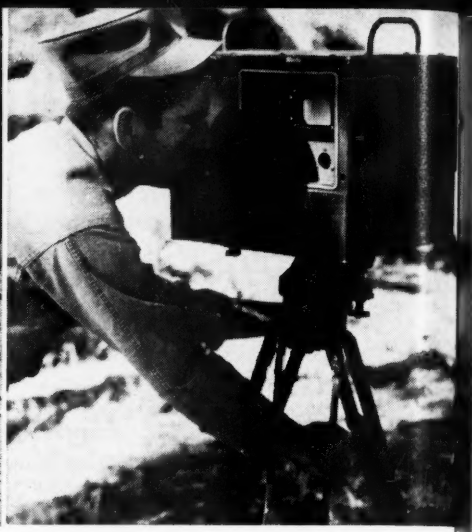
This program, extending three years into the future, is reviewed, amended as necessary, and approved by CONARC on a yearly basis. The program provides a series of scheduled projects for a complete examination of selected areas of primary significance of a given concept. The ensuing project analysis-planning-experimentation-reporting cycle, with joint military - scientific participation throughout, requires a two-year period for any one scheduled project within the program.

Re-supply of isolated tactical elements is accomplished by helicopters. Here an H-21 delivers a loaded Mechanical Mule.

Some thirteen months before an experiment is put into the field, a directive for experimentation planning is issued. This directive is analyzed by the military-scientific staff at CDEC and the resultant study, when approved, establishes the concept of experimentation and provides basic planning guidance for the project team.

The project team then prepares an outline plan, developing in more detail the schedule and time phasing of events, the specific experimental design for each phase, factors for measurement and evaluation, task organization of the troops, personnel requirements, critical materiel and support requirements, and budget estimates. The outline plan as approved by CDEC is forwarded to CONARC for final approval.

Meanwhile, detailed planning by the project team continues. Scenarios, data collection plans and forms, requirements for personnel, materiel, training range and area needs, as well as requirements for coordination with



Infrared scope, left, permits tactical commander to observe enemy activities in darkness. Right, "Scanrod" can serve as mechanical sentry on a perimeter defense.

other agencies are developed. When all requirements have been fulfilled, the experiment is placed into the field to produce the observations and data upon which CDEC evaluations are based.

Field Problems

THE first problem encountered in the field is the accurate simulation of a battle in order to provide a valid basis for evaluation. A particularly difficult problem has been the simulation of two-sided engagements of direct-fire weapons when opposing forces are in close contact.

Weapons and their action on both sides must be realistically simulated so that the troops can intelligently identify the weapons being employed against them, make reports and decisions, and direct counter fires—just as they would in actual combat. Further, in each direct fire engagement the results in terms of fire effect and targets destroyed must be determined and acted upon with the same speed as might occur when using live fire.

The system must be so designed that each time a gun fires at a target, controllers at both locations can rapidly intercommunicate, determine effects, assess casualties, and report the results to a control center. With many engagements occurring simultaneously in a mobile fire fight, the difficulty of the problem and the complex facilities and techniques required to do the job are readily apparent.

As one means of solving this problem, an automatic hit-kill indicator system is being developed, to signify instantaneously that a target has been hit and at the same time notify the crew of the opposing weapon that a hit had been scored. This system, employing automatic gun-target intercommunication techniques, would perform all essential steps in less than a minute.

While a combat action is in progress, it is of the utmost importance that the precise locations of units, down to the smallest echelon and often including individual vehicles and combatants, be known at all times. A fast and accurate system for reporting these locations is required so that the participants concerned—especially the umpires and controllers in the field—can determine and report positions and effect casualty assessments without delay.

A special system of determining

location changes was devised to meet CDEC requirements. This system utilizes letter and color code designations to identify each 100-meter square by an appropriate sign depicting these codes. Research and study is being continued to develop a better means whereby position location can be readily determined, quickly recorded, and automatically transmitted and displayed for action.

Test Site

EXPERIMENTAL operations are conducted at Hunter Liggett Military Reservation—a 200,000-acre maneuver area which constitutes CDEC's field laboratory. This field laboratory provides the means for realistically simulating a two-sided battle covering many thousands of acres. It also provides a control system to observe, monitor, and record every phase of the action. To accomplish this, the entire area has been surveyed and markers have been installed so that the location of all actions, large and small, can be accurately and continuously determined.

The several hundred umpire and controller personnel in the field are linked with the Experimentation Control Center (ECC) and with each other by a special radio communication and relay network which assures rapid, dependable, and highly flexible intercommunication. As a result, the entire battle action in the field may be recorded and visually displayed on situation maps and statistical charts at the ECC simultaneously with the progress of events in the field. This permits the high degree of control required in any experimental operation and, equally important, makes it possible to reconstruct any and all phases of the action under consideration for later and more deliberate analysis.

At CDEC the dazzling variety of a "Big-Top" circus has been surpassed by a military version of a four-ring show—with four project teams simultaneously operating on different phases of a two-year cycle of experimentation. This is what the operation currently looks like:

Project Team 1 is in the report phase of the spring 1960 experiment. Team 2 is conducting the fall experiment. Team 3 has completed the outline plan for the spring 1961 experiment and has begun the detailed plan. Team 4 is conducting the project analysis for the fall 1961 experiment. As soon as Team 1 completes its report, it will be assigned responsibility for planning and conducting the experiment to be fielded in spring 1962.

Thermograph is another infrared device that operates by spotting emitted heat radiation to find enemy in dark.

A high-speed entrenching machine makes a quick job of digging trench, above, or of scooping field fortification, at left.

Present Goals

MUCH has been accomplished by CDEC, but much remains to be done. The conduct and scientific evaluation of combat actions on a non-lethal battlefield remains a truly challenging problem. It has proven difficult and frequently impossible to "measure" many aspects of combat operations in order to collect data which can then be analyzed statistically to "prove" beyond doubt the degree of efficacy or inadequacy of an experimental organization or concept.

What are the specific performance factors that contribute to combat effectiveness of an organization? How

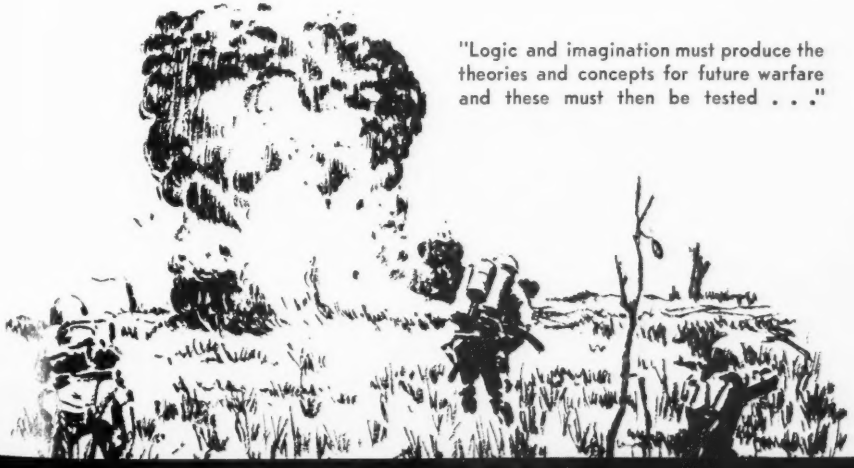
Mine layer operated by CDEC experimentation troops sets out 150 anti-tank mines in ten minutes to give protection.

much does each of the many factors involved affect the others and contribute to the overall effectiveness desired? Unless these questions can be answered in concrete measurable terms, it is difficult or impossible to arrive at a statistical scoring system which will be conclusive or significant. However, many measurements can be made which give useful indications of effective performance, and assist in the evaluation of experimental results based on military observation and experienced judgment.

Continuing detailed study and emphasis are being devoted to the revision and extension of combat effectiveness factors and measurement criteria used in experimentation. While military judgment and experience will necessarily remain primary tools in the evaluation process, it is CDEC's goal to augment and support this judgment with the most objective data and measurements and the most conclusive statistical analysis possible.

Extensive studies of the entire field laboratory complex and its requirements are being conducted by scientific contractors with a view to designing the most effective integrated system which technology can provide. Eventual goal is the establishment of an automated system which will instantly establish and centrally display the precise location of all experimental elements in the field, report detailed results of fire actions and other events as they occur, and record all results for post-experiment analysis and review. As this long-term goal is approached, human errors and delays can be reduced, and the validity of collected data can be better assured.

The larger the action being simulated and the longer the time period of the operations being examined, the more difficult becomes the control problem to assure conformance with the prescribed tactical concepts. Furthermore, the extent of training required to prepare both troops and



"Logic and imagination must produce the theories and concepts for future warfare and these must then be tested . . ."

A soldier evaluates comfort and visual field of protective eye armor goggles, in tests of improved protective devices.

control personnel is multiplied, while the time available remains severely restricted.

Much progress has been effected in training of units and controller personnel by placing the greatest emphasis on appropriate training *prior* to fielding an experiment. In combat, the quality of the results obtained on the battlefield has invariably been related directly to the training received by troops prior to participation.

Looking Ahead

AT CDEC it is fully recognized that only by the attainment of the highest state of proficiency in tactics and techniques by all participating troops can a valid evaluation of concepts be obtained. Greater improvement is sought in reducing the need for weapon and equipment simulation. As prototypes of weapons or equipment contemplated for the 1965-70 era become available, every effort will be made to obtain them, even if only a single item, to facilitate proper training and eliminate another one of the variables that plague a simulated battle action.

It is only realistic to recognize that breakthroughs in these and other areas will be necessary before the CDEC organization can attain its full usefulness as a scientific proving ground for future warfare. However, it is equally realistic to recognize the major hurdles and growing pains which have been surmounted in the past and to expect confidently that the same success will be realized in attaining the required breakthroughs in the future.

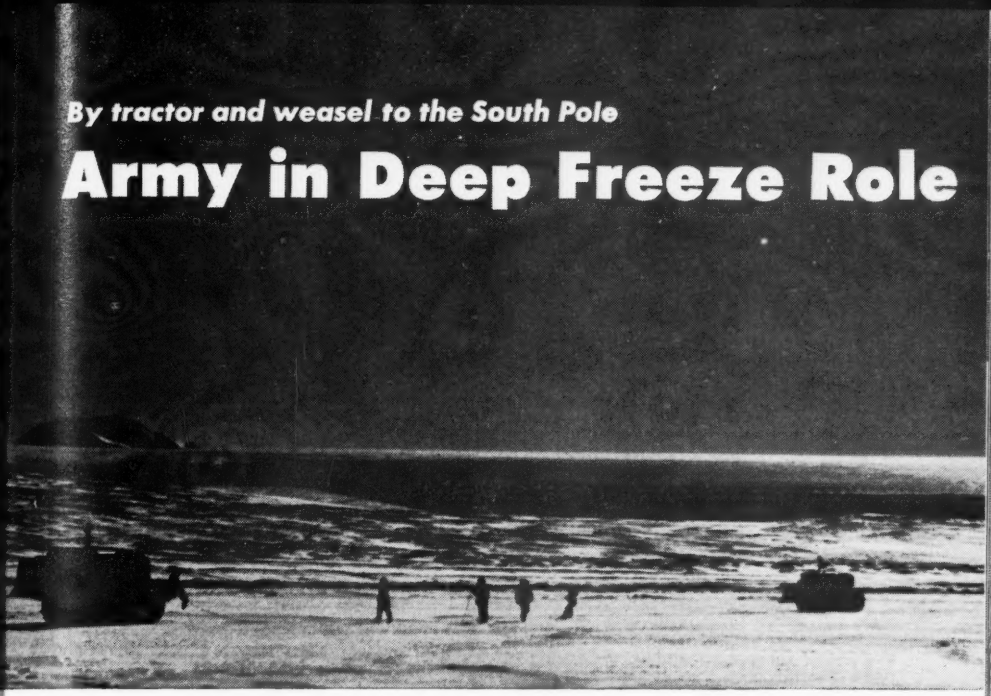
There can be no doubt that CDEC occupies a position of critical significance in developing the army of the future. The significance of the breakthroughs attained here will be at least as great as that which can be attained in any other field of military endeavor.

CDEC is not trying to predict the future. On the contrary, everything possible is being done to take full advantage of scientific skills and military experience in testing new tactics, techniques, and weapons in order that the future of the United States Army on the battlefield of tomorrow will not be left to chance, fate, or the fortunes of war.

Thundering skyward with assistance of jet assist takeoff device, a surveillance drone starts on a mission over enemy territory to bring back intelligence data.

By tractor and weasel to the South Pole

Army in Deep Freeze Role



THE first group of Americans ever to reach the South Pole by traveling overland was led by Major Antero Havola, U. S. Army, as part of the Navy-directed Operation Deep Freeze. The 11-man expedition — including Army and Navy personnel and two civilian scientists — started out 8 December 1960 from Byrd Station in Antarctica to deliver two 38-ton D-8 tractors and a weasel to the U. S. South Pole Station of Operation Deep Freeze. Each tractor towed three 20-ton sleds and a ten-ton sled, while two sled-mounted wannigan huts followed the weasel. The train reached its goal on 11 January 1961.

Chief Warrant Officer George W. Fowler, U. S. Army, rode in the tractors' lead vehicle as navigation officer, taking sights and making other readings. The civilian scientists took weather observations and performed other studies. Weather reports, sent back daily, were used for operational forecasts, then relayed to the International Antarctic Analysis Center for Weather in Melbourne, Australia.

On way to South Pole, Major Havola, leader of the group, stands third from left before one of the tractors.

This unique top-level armed forces college emphasizes economic and industrial aspects in developing

Leadership

Lieutenant General
George W. Mundy, USAF

DURING the past generation, and more particularly since the end of World War II, our Nation has witnessed a profound change in the philosophy of military education. Only a scant two dozen years ago, a military commander was expected to confine himself to strictly "military matters" of battlefield tactics and strategy. In fact, the general officer who delved into the study of economics, politics, and international relations was looked upon with some suspicion by fellow officers and civilian associates.

Today's national security planner—whether uniformed field commander or civilian executive in government—must have a clear understanding not only of the military capabilities of the nations of the world, but of their economic development and potential and of the psychological characteristics and political ambitions of their people as well.

It is the unique mission of the Industrial College of the Armed Forces "to conduct courses of study in the economic and industrial aspects of national security under all conditions . . . in order to enhance the preparation of selected military officers and key civilian personnel for important command, staff and policy-making positions in the national and international security structure." This is done by carefully considering economic factors as they affect, and in turn are affected by, the political, social, scientific, and military aspects.

The Industrial College of the Armed Forces, together with its sister college, the National War College, stands at the pinnacle of the educational system within the Department of Defense. It conducts its courses in an atmosphere of absolute academic freedom.

Resident students are given no textbook solutions and take no graded exercises. Rather, their "texts" are the expressed opinions of the guest speakers and panelists—leaders of government, industry, science, labor, and education—and the experiences of the faculty and individual students.

This is supplemented by a field study program during which students and faculty members visit various industrial complexes in the United States and representative areas in Europe, Latin America, the Middle East, Asia, and Africa. This gives them an on-the-scene opportunity to assess the political, economic, and social climate.

The "exercise" takes the form of individual and group research papers and reports and oral presentations, in which the students develop what they consider to be the measures and programs necessary to assure the security of the United States and the Free World under all conditions, including continued world tensions, limited war, and all-out conflict. Special consideration is given to plans for the survival of the Nation in a post-attack period should deterrence fail.

For National Security

In developing its academic program, the college took cognizance of the ever-increasing requirements placed on senior governmental officials and military commanders who, in developing their plans, must be fully aware of the impact on the national economy and of the ability of the economy to support these plans.

This is a far cry from the program of study initially offered to the handful of officers who attended the first class of the Army Industrial College, predecessor of the Industrial College of the Armed Forces, in 1924. They were primarily concerned with problems of the planned mobilization of industry in support of the armed forces in time of war. But even this modest beginning was a radical bridging of the chasm which had traditionally separated military planners and leaders of industry.

Resident Course

TODAY the average 10-month resident class, starting in August of each year, consists of about 150 students—40 highly selected military officers from each of the military departments, and the rest civilian officials from a dozen or more governmental departments and agencies. Officer students are generally in the grade of Army colonel or Navy captain; the

civilians, GS-13, FSO-3 or higher. All are selected for their proven ability and future potential.

While the primary method of instruction is the lecture system followed by a question and answer period addressed to distinguished guest speakers who are experts on the various areas under study, the students continue their study of the subject afterward in small committee groups and seminars. They also spend considerable time on individual study and research.

The college maintains one of the world's finest specialized libraries, containing more than 100,000 items. Students also have access to the research facilities of more than 200 other libraries located in the Washington area, and to the resources of many governmental agencies and private organizations.

Since 1946, when the Army Industrial College was redesignated the Industrial College of the Armed Forces, some 1,900 officers and civilians have completed the Resident Course. These graduates are making a significant contribution to the national security program, either as active participants in the armed services and the various governmental agencies, or as business executives, consultants, and educators in civilian life.

Seminar Program

THE college realized long ago that it was not enough to provide instruction for a relatively small group of resident students; the public, too, must be made aware of the nature of the threat that faces our Nation and of the steps that are necessary to meet it. The Joint Chiefs of Staff, under whose direction the college operates, therefore approved an extension program to carry the college program to selected reserve officers, active duty officers, and leaders in business, the professions, labor, industry, and civic organizations.

In 1948, a program of National Security Seminars was instituted. These are two-week condensations of the material offered in the Resident Course, presented by two teams of selected military faculty members in some 14 different cities throughout the United States each year.

Each faculty team consists of six officers, two from each of the military departments. Although the instruction is provided by the Industrial College, each seminar is sponsored and conducted by local committees in conjunction with the respective U. S. Armies, Naval Districts, and Air Force Reserve Regions.

Through the end of the last academic year, 196 seminars had been presented in 110 different cities. More than 52,000 individuals have received certificates of completion. Reserve officers attending on orders also earn promotion and retirement credits.

In 1950 a Correspondence Study Course was initiated. This course, also

Lieutenant General George W. Mundy, USAF
Commandant,
Industrial College of Armed Forces
Washington, D. C.

Containing modern facilities, including provisions for closed circuit TV, new Industrial College building was designed to harmonize with others at Fort McNair.

based on the Resident Course, consists of 22 bound volumes plus supplemental reading material and exercises. It is available without cost to officers of the regular and reserve components and to qualified civilians in government, industry, labor, and the professions. Normally, the course takes about 15 months to complete. Applications should be addressed to the Director, Correspondence Study Course Division, Industrial College of the Armed Forces, Washington 25, D. C. Each application is judged on its individual merits.

Staff Organization

TO CARRY out its program of instruction, the Industrial College is divided into two academic entities and an Administration Department. The School of Resident Studies is responsible for the operation of the Resident Course. It also prepares the material for the Correspondence Study Course and furnishes background information for the seminar program. The School of Extension Studies administers the National Security Seminars and the Correspondence Study Course. The Administration Department supports the academic activities and provides housekeeping functions.

The college is headed by a Commandant and two Deputy Commandants. These three positions rotate periodically among the three military departments so that each is represented at all times. Each Deputy Commandant heads one of the two Schools.* The Senior Educational Adviser counsels the Commandant on educational matters and instructional techniques. The Executive Officer heads the Administration Department.

The Commandant also has available on his staff a senior adviser from the Department of State and from the Office of Civil and Defense Mobiliza-

*Major General Evans M. Houseman, USA, is Deputy Commandant of the School of Extension Studies. Rear Admiral G. Serpel Patrick, USN, is Deputy Commandant, School of Resident Studies.

"Our liberties rest with our people, upon the scope and depth of their understanding of the spiritual, political, and economic realities which underlie our national purpose and sustain our Nation's security. It is the high mission of the Industrial College of the Armed Forces to develop such understanding among our people and their military and civilian leaders. So doing, we will make the wisest use of our resources in promoting our common defense. The Industrial College of the Armed Forces has been a guidepost pointing to the greatly increased quality of our defense capacity; it must continue to point to an ever-ascending progress for the years ahead."

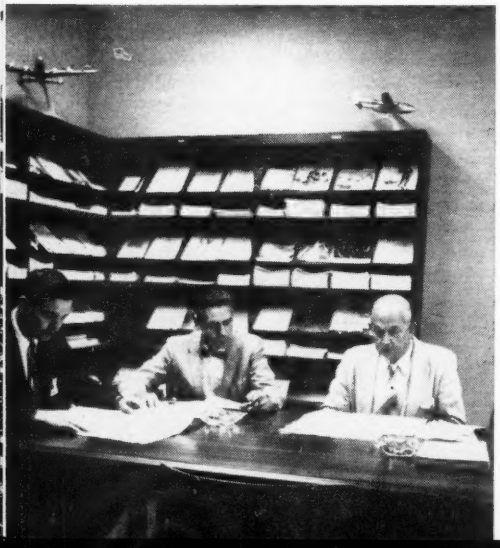
President Dwight D. Eisenhower at dedication of academic building, Industrial College of the Armed Forces, September 1960.

Instruction is carried on largely by informal committee sessions in meetings with experts in varied areas.

tion—both assigned by their respective agencies to provide ready liaison with the college. They also are available to the faculty and students on all matters of mutual interest, making available up-to-date information.

The Board of Advisers—a group of 12 distinguished leaders in government, business, labor, and education—serve at the invitation of the Commandant, and meet with him periodically to discuss the entire college program. They provide invaluable contacts with their respective activities and assure that a cross-section of national interests is represented in college planning.

Popular center for students at the College is the periodical reading room of library, which stocks over 100,000 items.

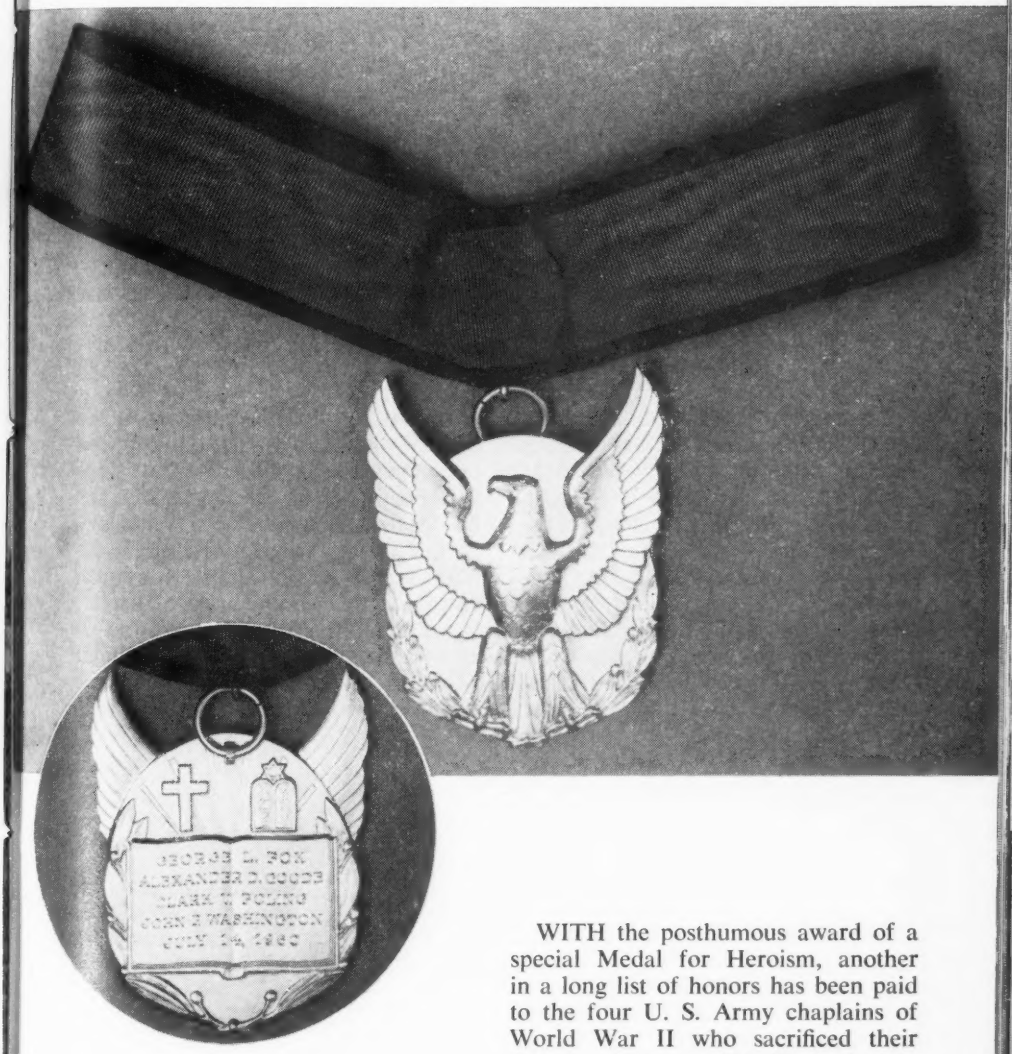


Planning for National Security

THROUGHOUT the 36 years of its existence, the college has constantly adjusted its program to meet the changes in the national and international climate. It has always been a leader in providing its students with a realistic appreciation of all the factors that influence planning in the field of national security.

At the dedication of its new academic building at Fort Lesley J. McNair in September 1960, General Lyman L. Lemnitzer, Chairman of the Joint Chiefs of Staff, called the college "an educational institution which is not matched in any country of the world today. . . . The national government, the Nation's industry, and its educational institutions everywhere have benefited no less than our armed forces from the stimulation, the methodology, and the vision which have been provided by this unique college."

Medal for Heroism Commemorates Four Chaplains' Sacrifice



WITH the posthumous award of a special Medal for Heroism, another in a long list of honors has been paid to the four U. S. Army chaplains of World War II who sacrificed their lives by giving up their life jackets to servicemen aboard a sinking ship.

Chaplain Alexander D. Goode

Chaplain George L. Fox

The medal, specially authorized by the Congress, was presented by retiring Secretary of the Army Wilber M. Brucker to kin of each chaplain at Fort Myer, Virginia, on 18 January.

Previously the four chaplains had been posthumously awarded the Distinguished Service Cross in 1944; a three-cent postage stamp honoring them was released by the Post Office Department in 1948; a painting by Dudley Summers is on display in the New York City headquarters office of the National Conference of Christians and Jews in New York City; a therapeutic pool for disabled veterans has been dedicated in their memory at the Bronx Veterans Hospital; an interfaith memorial chapel has been erected to them in the crypt of Baptist Temple in Philadelphia; and there is a symbolic statue to them in National Memorial Cemetery, Falls Church, Virginia. In addition, "A Living Me-

Medal for Heroism is presented to kin of chaplains by Wilber M. Brucker as Gen. George H. Decker looks on.

Chaplain John P. Washington

Chaplain Clark V. Poling

morial of Good Books" has been established by York County Branch of The Association for Childhood Education, York, Pennsylvania.

The four chaplains, all first lieutenants, were George L. Fox and Clark V. Poling, Protestants; John P. Washington, Roman Catholic; and Alexander D. Goode, Jewish. They took part in one of the great stories of heroic sacrifice to come out of World War II.

On the night of 3 February 1943, their troop ship, the *Dorchester,* was hit by a torpedo in the cold stretches of the North Atlantic off the coast of Greenland. As the ship listed and sank, the chaplains passed out life jackets, went among the men, encouraging and praying with them, then stripped off their own life jackets for four men who had none. When last seen, they were kneeling with arms linked on the slanting deck of the sinking vessel.

Special postage stamp was authorized as one of the many memorials to four Army chaplains who sacrificed their lives.

A proved record of experience passes another test as Army Engineers tackle the task of

Constructing M

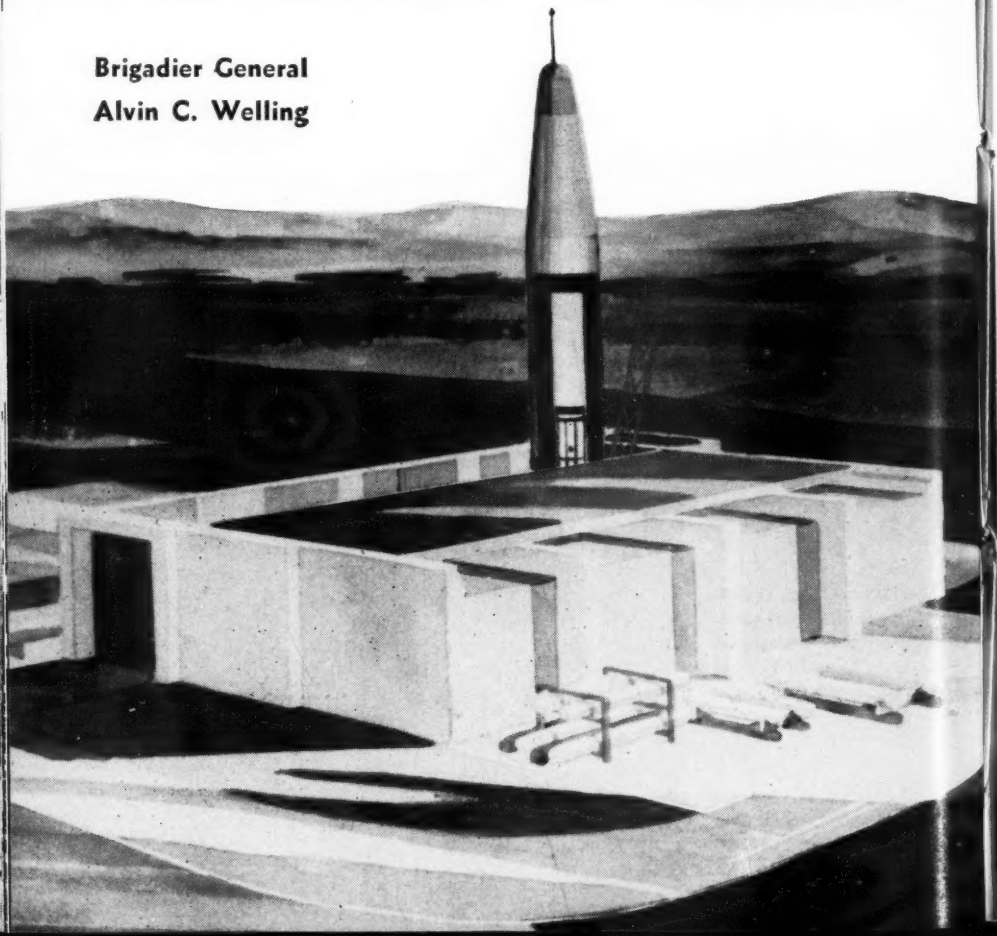
THE Department of Defense has a well-drilled, well-coached service team charged with putting the Nation's intercontinental ballistic missiles on the operational firing line.

For the Atlas, Titan, and Minuteman ICBM bases, the Air Force designs what is to be built, installs in the launcher facilities the missile and its related equipment, and thereafter mans the bases as powerful weapons in our national defense arsenal.

The Army job is to construct those ICBM bases. It is a grim business—and grimly and successfully the Army Corps of Engineers has gone about the task.

Time—or the lack of it—is a fun-

Brigadier General
Alvin C. Welling



g Missile Bases

damental element in this program. Construction operations must be carried out with the explosive speed of combat. Yet, as in no other combat construction, the Army is confronted with the requirement for utmost precision—the delicate precision of an instrument laboratory. This requirement—for extremely precise and extremely good workmanship—is the overriding demand placed by the Chief of Engineers on his field forces.

The combined demand for speed and precision created a unique construction mission. To cope with it, a unique construction organization was created.

By mid-1960, the preparation of the Nation's ICBM bases had taken on an importance equal to the development of the ICBM missiles themselves. The Secretary of Defense wanted to assure himself that the bases would move forward expeditiously. He and the Air Force and the Army realized that certain organizational changes would have to be made in order to give the country that assurance.

So far as the Army was concerned, General Lyman L. Lemnitzer, then Army Chief of Staff, General George H. Decker, then Army Vice Chief of Staff, and the Army Chief of Engineers, Lieutenant General E. C. Itschner, were determined that the construction mission would be accorded all of the resources which it required. They hit upon a drastic reorganization of the Army's construction machinery. The Air Force liked it. So did the Secretary of Defense. General Lemnitzer and General Itschner put it into being.

Organization for Action

THE new construction organization marked a new departure. Historically, the Corps of Engineers has performed its world-wide construction assignments on a geographical basis, with various projects assigned to the Corps' Districts and Divisions within which the projects were located.

Overall, the Corps of Engineers organization has the largest construction mission in the world. It grinds out over two billion dollars' worth of construction projects annually. From the base of that organization-in-being, the Army had initiated the construction of the ICBM projects.

But it was evident to the Chief of Staff and the Chief of Engineers that a totally new construction organization was required for the ICBM program. They wanted the optimum in firm and uniform control over a complex, intricate, and repetitious construction operation.

Realignment of the construction mission was comparatively simple, at least on paper. Responsibility for constructing the bases was transferred from the Corps of Engineers Districts to a new Army Engineer headquarters in Los Angeles—the U. S. Army Corps of Engineers Ballistic Missile Construction Office, which has since come to be known as CEBMCO. I

was designated Commander, reporting directly to the Chief of Staff and the Chief of Engineers.

On 1 August 1960, the new organization was put into action. It has been at work ever since.

Men in Charge

WHY was the new Army construction headquarters set up in Los Angeles? The answer is simple. Already located at the Inglewood complex was the Air Force Ballistic Missile Division, charged with developing the missiles and designing the facilities. Also located there was the Air Materiel Command's Ballistic Missile Center, charged with managing installation of the missile and its related equipment in the launcher facilities.

Two Air Force Commands—the Ballistic Missile Division (BMD), commanded by Major General O. J. Ritland, and the Ballistic Missiles Center (BMC), commanded by Major General T. P. Gerrity—and CEBMCO work together as a team in preparing the ICBM bases.

To staff and supply the new Army set-up at Inglewood, Lieutenant General R. W. Colglazier, Jr., Deputy Chief of Staff for Logistics, sent out the word that CEBMCO was to have all of the personnel and logistics support it required. As a result, all echelons of the Army have given unstintingly and have assisted admirably. Lt. Gen. Itschner, Army Chief of Engineers, personally and continually saw to it that the new construction organization was properly manned and fully tooled up.

MOST striking feature of the CEBMCO organizational pattern was the establishment of a separate "Vice President" in charge of each of the various types of missile base construction—one for the Atlas F bases; another for the first Titan bases; another for the second series of Titan bases; and a fourth for the Minuteman bases. As for the Atlas D and E bases which were already rather far advanced, construction responsibility was left in the various Corps of Engineers Districts.

Selecting the Vice Presidents—they were subsequently given the official title of Directors—was an extremely important undertaking. For the job of overseeing contract construction for the Federal Government is more than a science; it is also an art, requiring exceptional professional skill to get the job done.

The Vice Presidents were to have rather autonomous responsibility and authority, and they had to be officers capable of exercising them. The Corps wanted the best in the business—rough, tough, hard-bitten engineers who would ride herd over the most demanding construction jobs in the country—and it got them. They included such experienced and capable engineers as Colonel Thomas J. Hayes, III, Vice Commander of CEBMCO;

Brigadier General Alvin C. Welling
Commanding General,
U. S. Army Corps of Engineers Ballistic Missile Construction Office,
Los Angeles, California

Colonel Carlin H. Whitesell, in charge of Titan I; Colonel Carroll H. Dunn, Director for the newest generation of Titan missiles; Colonel Woodrow W. Wilson, in charge of Atlas F construction; and Colonel Charles C. Noble, Vice President for Atlas D and E and the Minuteman.

Backing up CEBMCO headquarters is a splendid contingent of Corps of Engineers civilian personnel, some 500 strong, ranging from professional engineers to administrative and clerical assistants. They provide varied technical and administrative skills, matching their officers in intensity of spirit and competence in getting the job done.

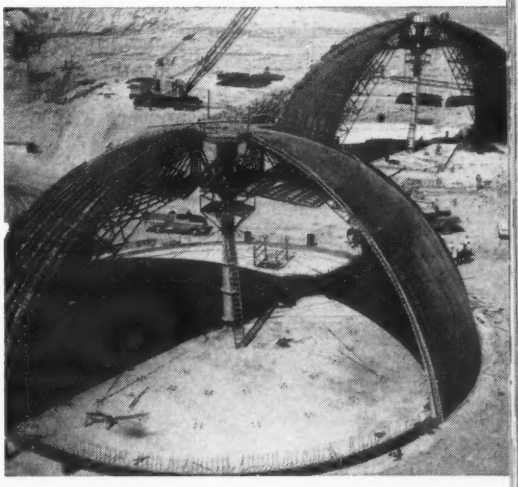
The passing of construction responsibility from the Division and District Engineers to CEBMCO was smoothly accomplished, without slippage or false steps. During its first weeks of existence, CEBMCO's main interest was to assist the Division and District Engineers then in control to race the construction effort forward.

Today the real firing line of the operation is at the construction projects themselves—out at the Area Offices, rather than back at headquarters. Since midsummer 1960 the General Staff and the Chief of Engineers have assisted tremendously in strengthening these Area Offices. Where formerly there were one or two officers, there are now seven or ten. The overall result is a 400 percent increase in officer strength in the field, and a 60 percent increase in Army civilians in project headquarters.

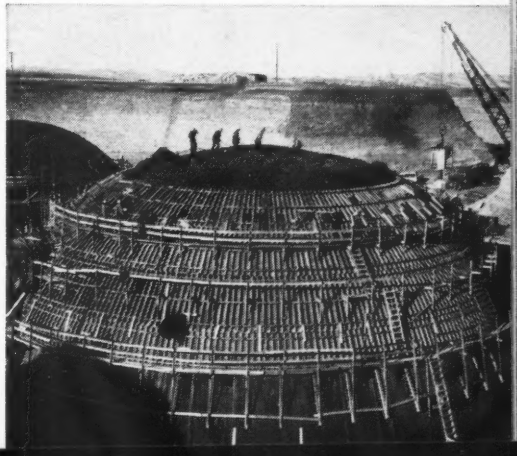
Contractors' Role

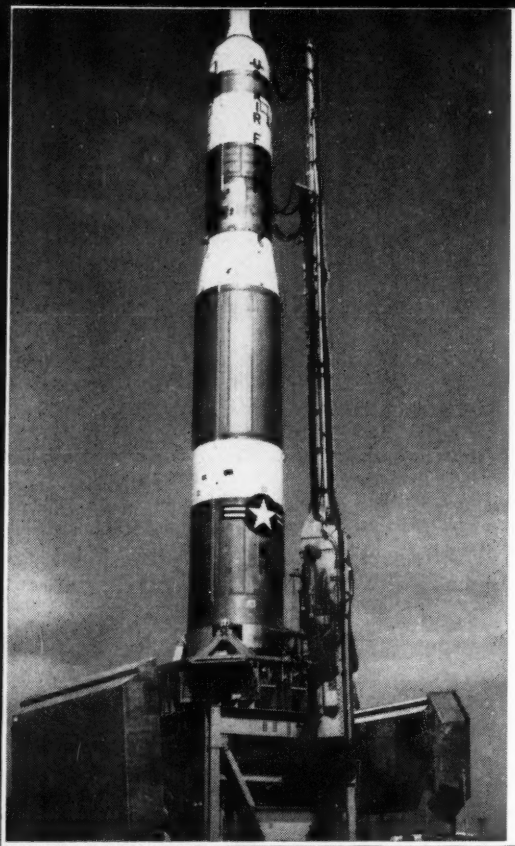
LIKE the Army, the construction industry has risen to the mighty task of bringing ICBM facilities into being. Ever since industrial leaders met with Secretary of Defense Gates last July, the contractors have been moving forward with renewed vigor. The task has not been an easy one. The facilities they are charged with building have intricate interface points with the

Through solid rock or down into watery muck, as above, engineers drive foundations to hold the huge Titan silos.



Heart of a Titan launch complex, dome-like powerhouse and control centers are shown here in construction stages.



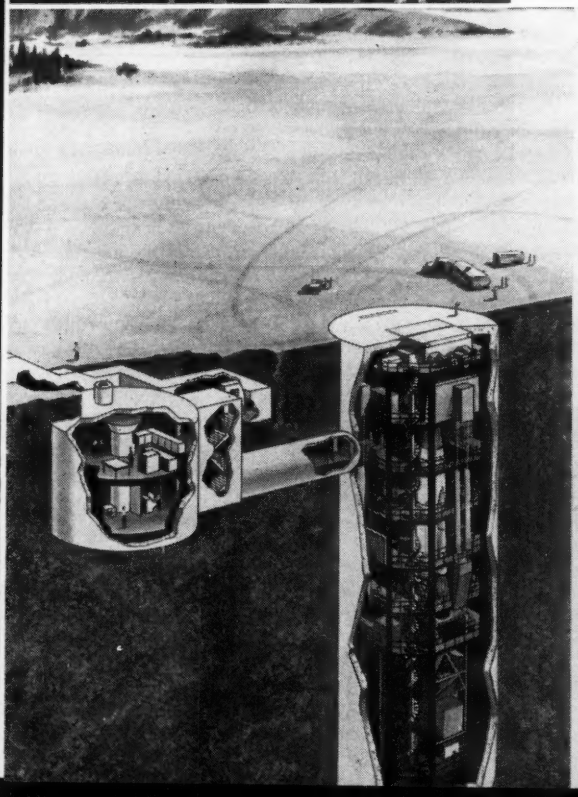


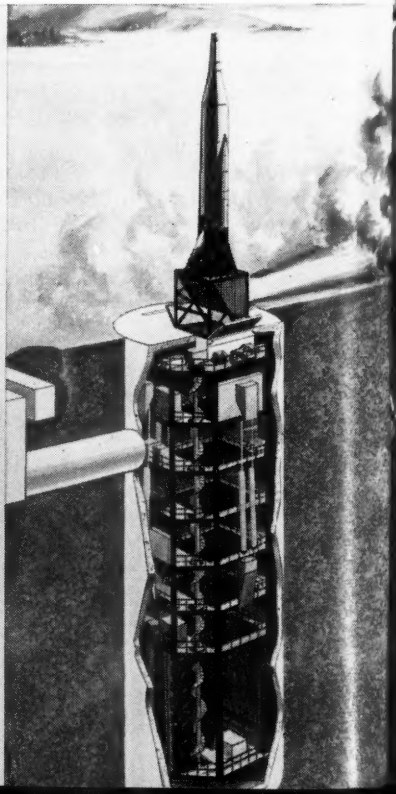
missile weapon system which is still under development. Modifications in contracts are sometimes necessary while construction is underway.

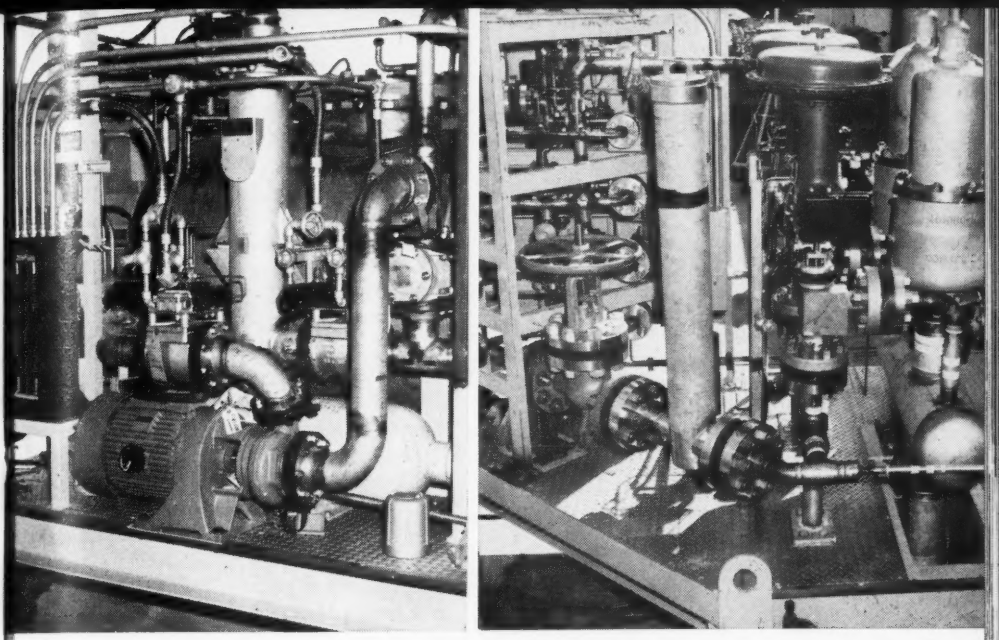
As modifications are passed to the contractor, it is sometimes difficult for the Government fully to assess the impact on the contractor's operations. Nonetheless, the contractors are told to proceed with the work in the interest of time-saving and to insure a workable system. The contractors thereupon buy their materials, develop shop drawings, and proceed with the installations, meanwhile financing much of that operation themselves until a reasonable cost can be determined in negotiations with the Government. In spite of such uncertainties and drawbacks, the construction industry has performed well.

The Secretary of Defense also met with leaders of the labor unions, and

A two-stage Titan ICBM rises, left, from its deep underground silo, workings of which are illustrated in drawing, below.







Installing complex and delicate fuel loading and pressure systems in a missile silo requires extreme accuracy on part of Army Engineers engaged in construction.

they and the American workmen they represent have responded extremely well. Such response is indispensable to the success of the program, for, in the final analysis, upon the American workman rests the ultimate task of getting the job done.

It is the American workman who must operate the equipment which excavates sites for the launchers; it is he who must place the reinforcing steel, pour the concrete, install the intricate, complex, and delicate equipment and machinery which are the guts of the launcher facilities. Upon the American workman depends the attainment in the field of a degree of perfection and precision rarely achieved even in the protected sanctuary of established shops and sometimes not even in highly controlled instrument laboratories.

Gigantic Effort

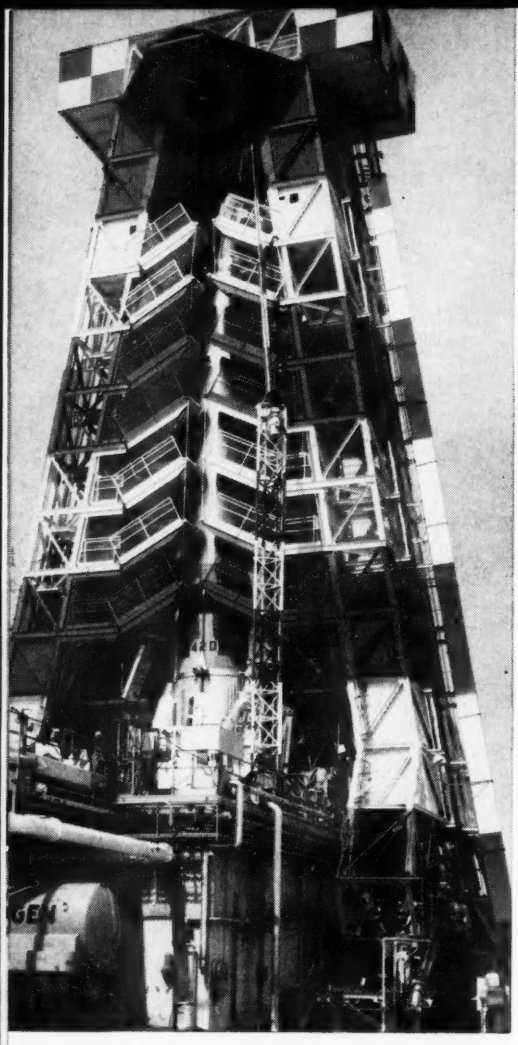
WHAT makes this construction effort so delicate, intricate, complex?

Considered in terms of dollars, it involves a billion-dollar-plus figure.

Considered in terms of geography, the program embraces projects along the Atlantic seaboard, in New York and in Florida; along the Pacific seaboard, in Washington and in California; along the Canadian border, in Montana; and along the Mexican border in Arizona, New Mexico, and Texas.

MERELY to set out from my headquarters in Los Angeles on a trip to each of the project headquarters involves traveling the equivalent of one-third the distance around the globe. And after arriving at the project headquarters, one would have almost an equal distance to travel to visit each launcher. The number of launchers per project varies from nine to over a hundred, and one project can cover an area one hundred by two hundred miles on a side.

While the exact number, specific location, and degree of readiness of the Atlas, Titan, and Minuteman launchers is classified information, the overall construction activity presents an impressive picture of vast intricacy and complexity.



Construction of such test facilities as this gantry and above-ground launch pad for an Atlas ICBM is an Engineer task.

Take, for instance, the launcher facilities for the first Titans and the latest Atlas missiles. In the underground silos where the missiles will be emplaced, a 13-story building could be erected. Within the silo for Atlas F, Army Engineers must erect the framework for supporting the missile and operating equipment.

To accommodate the missile hardware, construction tolerances must be far stricter than in normal civil engineering practice. Either in the silo or in other underground facilities constructed nearby, the Engineers must install electrical power plants, air conditioning and mechanical equipment and living quarters for the Strategic Air Command crew.

Perhaps the most difficult, most sensitive element of the underground work is the liquid fueling system known as the propellant loading system, with its related charges of helium, liquid nitrogen, and liquid oxygen. A temperature range from plus 100 degrees to minus 320 degrees Fahrenheit must be accommodated. Valves and pipe lines must stand test pressures of thousands of pounds per square inch. The liquid oxygen must be pumped at several thousand gallons per minute.

In the oxygen system scrupulous, super-cleanliness is required. Because large particles of contamination in liquid oxygen could contribute to the hazard of explosion, construction specifications permit no oil and no particles larger than the speck created by touching the sharpened point of a lead pencil on a white-painted wall.

It should be remembered, too, that all this equipment and piping which permit such temperature differentials and such high pressures and which require such an extreme degree of cleanliness are ultimately assembled far away from the laboratories and carefully scrubbed plants. They are assembled in the cornfields of Kansas, or in the prairies of South Dakota, a hundred or more feet under the earth's surface.

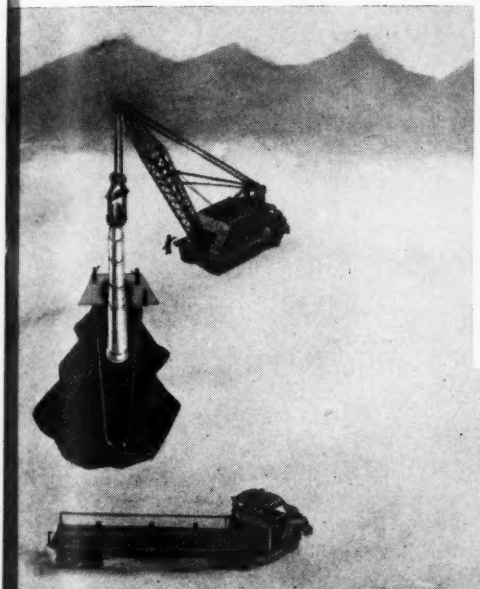
Needless to say, the magnitude of the job is tremendous. The cumulative silo depth of the many launchers alone totals more than several miles.

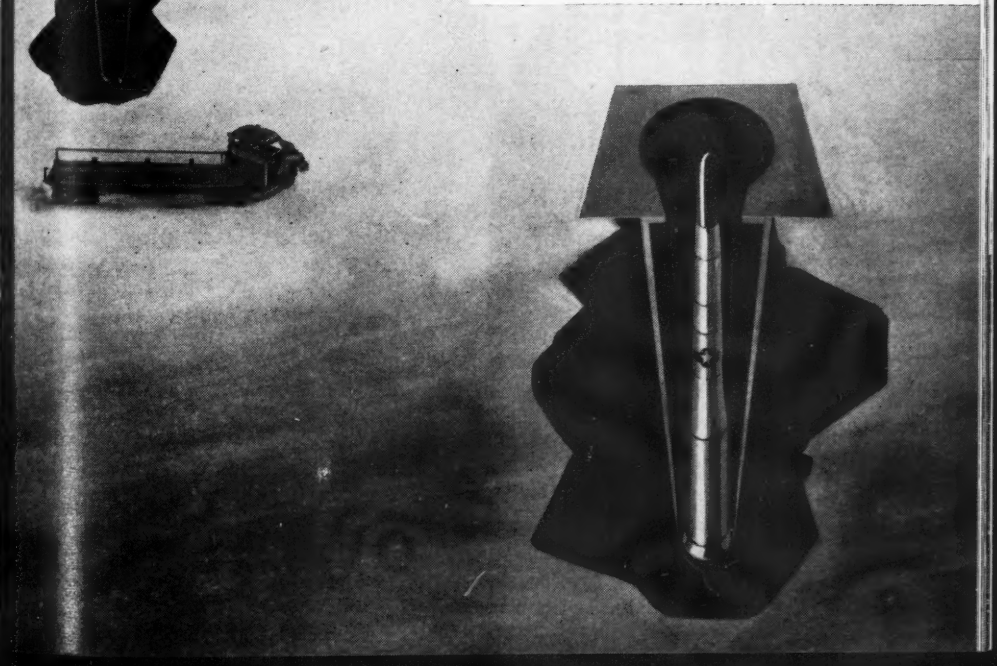
So far as the construction schedule is concerned, I personally regard every job as behind schedule until it is completed. Traditionally, we Engineers are able to meet the time requirements which have been put upon us. No matter what the difficulty or the press of time, no matter what the

vastness of the operation, the job is being done. It is being done, thanks to the overwhelming efforts of the Army and of the American construction industry, in league with the willing and capable American workman.

In this business of readying our Nation's ICBM bases, the interests of national defense require the finest sort of team performance from the Air Force and Army. That requirement is being met. The team is in operation. The bases are moving down the line.

Minuteman, right, is latest development in ICBMs, a three-stage weapon that will be housed in underground silos, below.





Seventh Army's O

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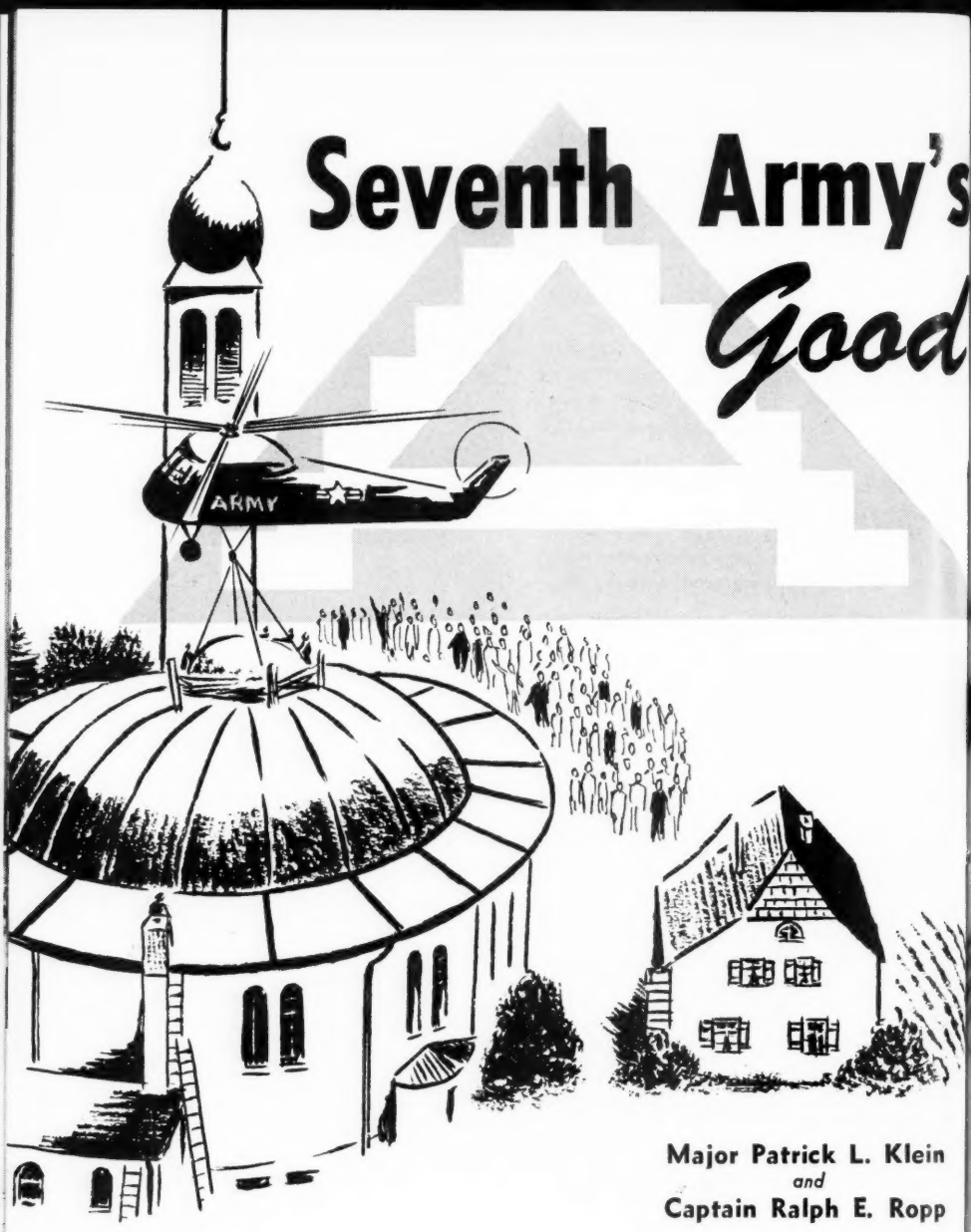
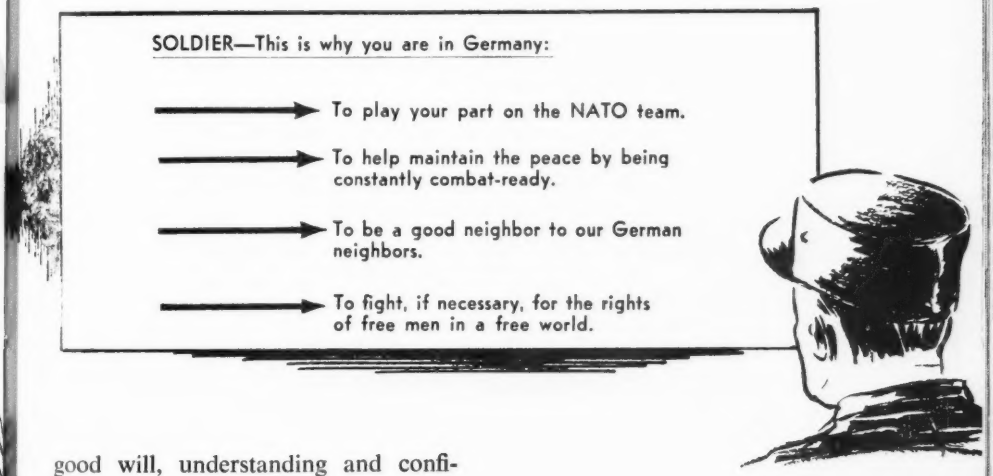


Major Patrick L. Klein
and
Captain Ralph E. Ropp

WHEN the Federal Republic of West Germany attained full sovereignty in May 1955, and later that year joined the North Atlantic Treaty Organization as fifteenth member, the German and American peoples became allies and partners in the cold war against Communism. In the process, Seventh Army troops became invited guests, working and living in close association with their hosts—the German people.

The presence of U. S. troops and dependents in Germany created the need for a community relations program that would engender a spirit of

's Other Mission—
d Neighbor


SOLDIER—This is why you are in Germany:
To play your part on the NATO team.
To help maintain the peace by being constantly combat-ready.
To be a good neighbor to our German neighbors.
To fight, if necessary, for the rights of free men in a free world.

good will, understanding and confidence between the two peoples. Reflecting this spirit, there hangs in each Seventh U. S. Army dayroom a chart similar to the one above.

So each Seventh Army soldier knows full well that while his primary mission is to be combat-ready at all times, his other mission is to maintain friendly relations with his German neighbors.

Cooperation In Many Forms

TROOP relations with members of the various German communities started as spontaneous affairs undertaken by individuals, organized groups, and units, performed as gestures of kindness and generosity so typical of Americans. These took the form of direct economic aid; distribution of food, clothing and money to orphanages, old people's homes and other needy groups; disaster relief to stricken areas; Christmas parties for German children; equipment and labor donated to worthy community projects.

A glance at the record reveals that—

City officials of Trier in 1959 were

MAJOR PATRICK L. KLEIN, Artillery, is Public Information Officer, Headquarters, Seventh U. S. Army. CAPTAIN RALPH E. ROPP, Infantry, is assigned to the same headquarters.

When problems arose in raising bell in German church, men and equipment of Army engineer unit put it into place.

haunted by visions of traffic jams when the Holy Robe of Christ would be put on display from mid-July to mid-September. More than 100,000 Christian pilgrims from all over the world were expected to throng the city daily to see the revered relic—and choke traffic in the process. Seventh Army engineers solved the city's problem by building four bridges over the city streets, thus providing safe overhead crossing for the pilgrims and preventing traffic jams.

There was water everywhere in the town of Schramberg in Baden one rainy week in May 1959, but its 20,000 inhabitants lacked drinking water because the town's fresh water point was put out of action by the floods. A Seventh Army engineer unit sent a six-tank pump to supply drinking water.

Under quite opposite conditions that same summer, Seventh Army water pumps kept the water-short town of Butzbach from hardship by providing potable water for the inhabitants during a rainless summer.

Farmers in the small town of Tailfingen, near Stuttgart, faced ruin in the summer of 1958 when a violent wind-storm demolished the trellises for hops, the principal money crop and a prime ingredient in beer-making. A construction crew from a nearby Army signal company re-built the supports to insure a banner crop.

That modern noisy bird, the helicopter, has proved of immense value in cementing cordial German-American relations. A Seventh Army H-34 helicopter deposited a 1,400-pound plexiglass dome atop St. John's Catholic Church in Mussbach as the town's 3,600 inhabitants cheered. On a rocky ledge above a precipitous mountainside in the Bavarian Alps, another helicopter pulled to safety a marooned and injured mountain climber. In one city an Army helicopter carried a traffic expert aloft, to enable him to plot and smooth the traffic flow. In another area, the roar of a helicopter engine routed starlings attacking the vineyards.

As versatile as the helicopter in Seventh Army's good relations with its German neighbors is the bulldozer with its skilled soldier operators.

In Fuerth, a twin-city of Nuremberg, in what was once a valley piled high with the rubble of war, there is today a neat, pleasant playground complete with sports field and swimming pools. Cleaning the debris and landscaping was done by bulldozers of a Seventh Army engineer battalion which helped its German neighbors while giving training to its personnel.

Bulldozers have helped to build many other sports fields, pools, gymnasiums, access roads, lake excavations, and flood control installations. Stuttgart's outdoor ice stadium was built with the help of a Seventh Army engineer battalion.

Helping to establish a cultural rapport between the American and German peoples, the Seventh Army Symphony Orchestra has won a legion of admirers. Last year it played to audiences totalling 70,000 in 87 concerts. (See "Musical Ambassadors in Army Green," December 1960 DIGEST.)

Methods of Approach

TODAY, Seventh Army maintains a formal, double-edged community relations program, entailing intensive troop orientation and indoctrination and a campaign for greater social contacts and associations between the German population and Seventh Army soldiers. Its success can be attributed to three methods of approach—

- Good working relations and liaison with the representatives of German information media—newspapers, magazines, radio and television.
- On the official level, frequent contacts between Seventh Army's ranking officers and German public officials and business, professional and cultural leaders.
- Contacts and get-togethers on the family and individual level.

With warmth and generosity, the Germans have responded by speech and act, as individuals, groups and communities.

A marked increase in individual and family contacts has been noted. German-American clubs engage in many kinds of sports activities, and German-American clubs for women have been formed and continue to flourish. Boy Scout and Girl Scout meetings and camp-outs, with German and American youths participating, are held frequently.

In recognition of Seventh Army's successful community relations efforts, the American Public Relations Association awarded it prizes two years in a row. In 1957, Seventh Army received the Achievement Award from the organization. In 1958 it was awarded the Association's coveted Silver Anvil, highest civilian award for public relations overseas. In 1959 it received a special citation from the Association for outstanding community relations.

Thus, as Seventh Army rounds out a full decade in Europe, the success of the community relations program which has been in high gear since 1955 daily becomes more apparent. Today Seventh Army not only is an invited guest—it is a welcome one in the Federal Republic of Germany.

Over-street bridges solved traffic problem in Trier, Germany, caused by throngs at religious festival.

More than a chronicle of past actions, Army historical studies illuminate the future with

Guidance from Experience

Brigadier General
James A. Norell

MORE THAN a quarter of a million people from all parts of the United States and many foreign countries, visiting the Smithsonian Institution in Washington last fall, saw at first hand some of the tangible products of the Army Historical Program. On exhibit was a multivolume display of the "United States Army

in World War II" series, which recently reached the impressive total of 50 volumes in print, plus numerous special studies and brochures on Army actions in World War II and Korea. The display was an outward manifestation of the Army's deep interest in its history—an interest prompted by its concern for guidance in facing future problems.

The agency charged with the mission of supervising these Army historical activities—the Office of the Chief of Military History (OCMH)—has a varied history of its own, tracing back to post-Civil War times.

The Army's first venture into producing histories began in 1880 with the publication of the first volume of *The War of the Rebellion: Official Records of the Union and Confederate Armies.* These records were selected by officers designated by the War Department rather than by a permanent office of the Army. Their publication continued through 1901, when the last of the 130 volumes appeared in print. These volumes have provided the basic sources for the flood of Civil War books, and have been used at the Staff Colleges of Great Britain and other countries of the Commonwealth for years.

Historical functions were first assigned to the General Staff in 1903, but no historians were assigned to perform them. Nothing concrete was attempted until 1918 when the Chief of Staff organized a Historical Section in the War Plans Division of the War Department.

He recommended to the Secretary of War a program for the Historical Section which included, besides collection of documents and reference services, the preparation of a narrative history of the Army's operations in the first World War. But Secretary Newton D. Baker promptly turned thumbs down on the preparation of a narrative history. "Such history," he declared, "would be incomplete unless it undertook to discuss economic, political and diplomatic questions; the discussion of such questions by military men would necessarily be controversial, and many of the questions would be impolitic for treatment by the War Department."

This declaration naturally forestalled the writing of officially sponsored narrative military history, leaving only the bare bones of a 17-volume selection of documents and a 3-volume order of battle to tell the story of the United States Army's participation in World War I.

A New Chapter

AS the United States prepared for World War II, the need inevitably arose for histories of the Army's experience in the earlier struggle, especially for histories of mobilization of manpower and industry. But these histories did not exist. The government therefore decided not to be caught short in future emergencies. President Roosevelt, in March 1942, directed all executive agencies to "preserve for those who come after us an accurate and objective account of our present experience."

For its part, the Army established historical sections in the headquarters of its three major zone of interior commands — the Army Ground Forces, Army Air Forces, and Army Service Forces. Then, in 1943, after historical offices sprang up spontaneously in overseas commands as well, the Army set up a Historical Branch in the Military Intelligence Division of the General Staff. This branch was the principal advisory and coordinating office of an Army-wide historical program. It was made responsible for preparing operational monographs, theater and campaign histories, administrative histories, a general popular account of the war, and documentary works.

No longer were objections such as Secretary Baker's allowed to prevent preparation of officially sponsored military history. The Army obviously

did not attempt to write a history of party politics, but it was no longer considered improper for the Army's military historians to discuss economic, political, and diplomatic questions if these discussions conformed to established historical canons. The criterion of controversiality was recognized as unsound in itself, and the sound historical criteria of accuracy, objectivity, relevance, and thoroughness were substituted.

It was recognized that good Army history is simply good history. The extent to which the earlier objections have been set aside is demonstrated by the green-bound series "United States Army in World War II," which includes such titles as *The Army and Economic Mobilization, The Army and Industrial Manpower, Rearming the French,* and *Strategic Planning for Coalition Warfare,* as well as accounts of campaigns and battles.

Mission and Tasks

AFTER World War II the Historical Branch was removed from G-2 and made a Special Staff Section with a general officer as chief. In 1956, the Office of the Chief of Military History was placed under the direct supervision and control of the Deputy Chief of Staff for Military Operations with the mission of preparing plans and policies for Army historical activities, supervising those activities to provide background and precedent in development of military plans, doctrine, and technique, and preparing historical material.

This general mission divides itself into five principal tasks:

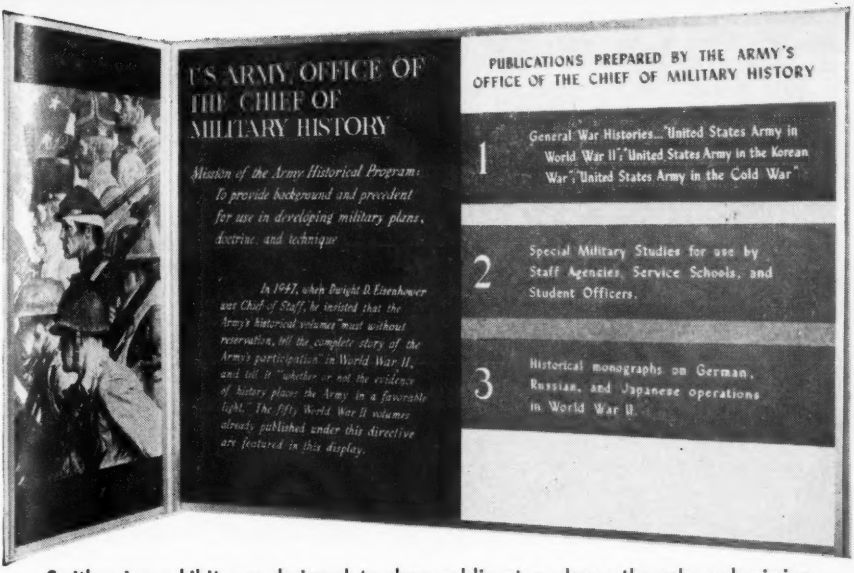
Advising the Chief of Staff on Historical Matters. This task is performed in the same way that any staff agency provides advice.

Coordinating and Supervising All Army Historical Matters. OCMH reviews the annual historical report of the major commands and Department of the Army staff divisions; and it also reviews and edits for publication the manuscripts prepared for the main Army series by the historical offices of the Technical Services.

The Chief of Military History is custodian of certain Army historical properties. These include General Patton's jeep, Reichsmarshal Herrmann Goering's baton, and four paintings by Adolf Hitler himself. These paintings naturally attract a good deal of attention. They are exhibited frequently and elicit from most visitors two comments—first, that Hitler was a better painter than they had realized, and second, that it is too bad for the world that he did not stick to painting.

Providing Historical Material. This is a constant responsibility of the OCMH General Reference staff of highly trained archivists and researchers. They locate and furnish source material and information to other offices and individuals in the Army, to the other armed forces, govern-

Brigadier General James A. Norell
Chief of Military History
Department of the Army


U.S. ARMY, OFFICE OF THE CHIEF OF MILITARY HISTORY
Mission of the Army Historical Program:
To provide background and precedent for use in developing military plans, doctrine, and technique
In 1947, when Dwight D. Eisenhower was Chief of Staff, he insisted that the Army's historical volumes "must without reservation, tell the complete story of the Army's participation" in World War II, and tell it "whether or not the evidence of history places the Army in a favorable light." The fifty World War II volumes already published under this directive are featured in this display.
PUBLICATIONS PREPARED BY THE ARMY'S OFFICE OF THE CHIEF OF MILITARY HISTORY
1
General War Histories..."United States Army in World War II","United States Army in the Korean War","United States Army in the Cold War"
2
Special Military Studies for use by Staff Agencies, Service Schools, and Student Officers.
3
Historical monographs on German, Russian, and Japanese operations in World War II.

Smithsonian exhibit was designed to show public at a glance the role and mission of the Army Historical Program, administered by Chief of Military History.

ment and civilian agencies, and to private individuals. Indicative of the magnitude of this activity, over 10,000 requests were handled last year.

Developing Historical Background of Army Organizations. The most important aspect of this task is closely related to the morale and esprit of the Army. It consists of determining the official lineage and battle honors of all units of the Army—Regular, Reserve, and National Guard. In this capacity, the office has been heavily involved since January 1957 in the development and implementation of the Combat Arms Regimental System.

Producing Histories of the U. S. Army. This has been the major effort in the Army's historical program since World War II. It has included preparation of the monumental series of volumes covering the Army's experience in that war—administrative, logistical, strategic, and economic, as well as tactical.

The "United States Army in World War II" series is perhaps the largest single historical project ever undertaken. Of the 80 volumes planned, 50 have been published, 3 more are now in the hands of the Government Printing Office and will be available soon, and some 20 others are well along in the research, writing and editorial stages. Nearly 85,000 copies of these volumes have been sold to the general public, and an equal number have been distributed to Army and other government agencies through official channels.

During World War II, OCMH also prepared a series of 14 paper-backed histories under the general title, "American Forces in Action" (AFA). These covered selected battles—three from the European Theater of Operations, four from the Pacific, five from the Mediterranean, one from China-Burma-India, and one on small unit fights in France, Italy, and the Marianas. Work on this series was suspended long ago in favor of the more comprehensive World War II volumes. At last report, the Government Printing Office had sold more than 200,000 AFA booklets to the general public.

The mission of preparing histories has been extended to include volumes dealing with the history of the Army since 1945, which will involve the Cold War as well as the war in Korea.

The first volume of a new series, "United States Army in the Korean War," is scheduled for publication this spring.

Special Studies

OCMH also prepares applied and foreign studies. Applied studies are usually topical in nature, dealing with one facet of a broad field, and are generally prepared in answer to a request from a staff agency of the Army. Typical subjects are: *History of Military Mobilization in the U. S. Army, The Personnel Replacement System of the U. S. Army,* and *History of Prisoner of War Utilization by the U. S. Army.*

Foreign studies embrace monographs prepared in support of larger histories, or upon request of other agencies, and include such subjects as: *German Campaign in the East, German Campaign in Poland, Historical Review of Landing Operations of the Japanese Forces,* and (*Japanese*) *Army Operations in China, December 1941-December 1943.* A 3-volume series covering major operations of the German Army in Russia during World War II is well under way. All these publications are intended for use by the Army, especially in its schools, as well as by civilians who are eager to increase their knowledge of problems of national defense.

Additionally, OCMH prepares studies of various kinds for Army planners, and at every opportunity it supports Army schools in their instruction. Several years ago, for example, studies of 25 important command decisions were prepared at the request of the U. S. Army Command and General Staff College. These were so well received, and dealt with matters of such vital interest, that they have since been published under the title *Command Decisions,* in commercial editions in this country and Great Britain. A revised and enlarged edition of the same work has recently come off the Government Printing Office presses and is now for sale by the Superintendent of Documents. (For book list, see "Army Historical Series," February 1961 DIGEST.)

In support of the ROTC program in colleges and universities, OCMH has a continuing responsibility for ROTC Manual 145-20, *American Military History.* The first edition, written by OCMH historians, had a printing of 120,000 copies, and stocks were exhausted within two years. A second edition, revised, enlarged, and brought up to date to include developments after Korea, was published in 1959 in 100,000 copies. Of all the books prepared by OCMH, the ROTC manual boasts the most extensive readership.

High Standards Maintained

ALL works produced by OCMH, or published with the Office's approval, must meet the highest standards of military and historical scholarship. Toward this end, every manuscript is carefully reviewed by or under the supervision of the Chief Historian as part of his job as adviser to the Chief of Military History on the professional and technical aspects of history. In this capacity, he receives advice from major participants in the events described, from leading civilian historians, and from the Chief of the OCMH Histories Division, who is *ex officio* the principal military critic of OCMH publications.

These, then, are the missions and the products of the Office of the Chief of Military History—an organization staffed by a unique military-civilian team of authors, editors, archivists, researchers, and cartographers. The favorable reviews which their volumes have received from the military and historical journals and the public press are due to their skill and devotion; at the same time, every accolade is also a tribute to the Army's basic decision to carry forward a far-reaching program of publishing the story of its experiences in war and peace.

After two years and millions of miles of driving, the Army concludes its AASHO

Test Road Project

THE Army's contribution to the recently-concluded Test Road Project at Ottawa, Illinois, has won praise from the American Association of State Highway Officials. Army Transportation Corps officers and enlisted men worked for the two years on the all-weather, continuous vehicle run, in tests which will contribute to improvements in future road building. (See "Better Highways for National Defense," January 1960 DIGEST.)

During the test, a fleet of Army-manned trucks rolled up 17 million miles of travel on five test loops—the equivalent of 683 times around the world.

Army drivers taking part in road tests drove their vehicles over many thousands of miles at Ottawa, Illinois.

As drivers maintained daily round through heat or snow, a careful check was kept of fuel consumption.

As a follow-up to Transportation School Training Army aviation maintenance men

Learn With Industry

Chief Warrant Officer H. E. Woodward

COMBINING civilian management training theory and practice with the U. S. Army's own aircraft maintenance training has proved beneficial to United States and allied students alike at the Transportation School, Fort Eustis, Virginia. In 1958, instruction at the overhaul facility of Trans World Airlines, Inc., Mid-Continent International Airport, Kansas City, Missouri, was added to the instruction already given at Fort Eustis. Since then some 385 officers—including 87 foreign students from SEATO and NATO countries—have qualified in MOS 4823, Aircraft Maintenance Officer.

The composite course, worked out in cooperation with TWA, trains aviation personnel to coordinate and supervise organizatonal, field and depot aircraft maintenance, including technical inspections of various Army aircraft systems. Although most of the students are rated pilots, this is not a requirement for the course.

Academic subjects are taught in the 15-week course at the Army Transportation School. These include logistics, personnel and administration, maintenance management and analysis aircraft power trains, instrument and electrical systems, hydraulics, structure repair, rotor and propellor blade maintenance, aviation maintenance support, production control, flight testing.

At the TWA facility in Kansas City, classes cover related academic subjects within the framework of technical services including management analysis, maintenance supervision, scheduling, production and quality control. Complete and detailed major overhaul work is performed on entire aircraft systems, both piston-driven and jet.

In addition to the technical aspects, students receive extensive training in personnel procurement and training requirements. The AMOC students not only learn the theory of the commercial approach to aviation maintenance but receive a thorough, practical course on the production line. Some aspects of Army training at Kansas City are depicted here.

CHIEF WARRANT OFFICER H. E. WOODWARD was formerly Assistant Information Officer, Army Transportation School, Fort Eustis, Virginia.

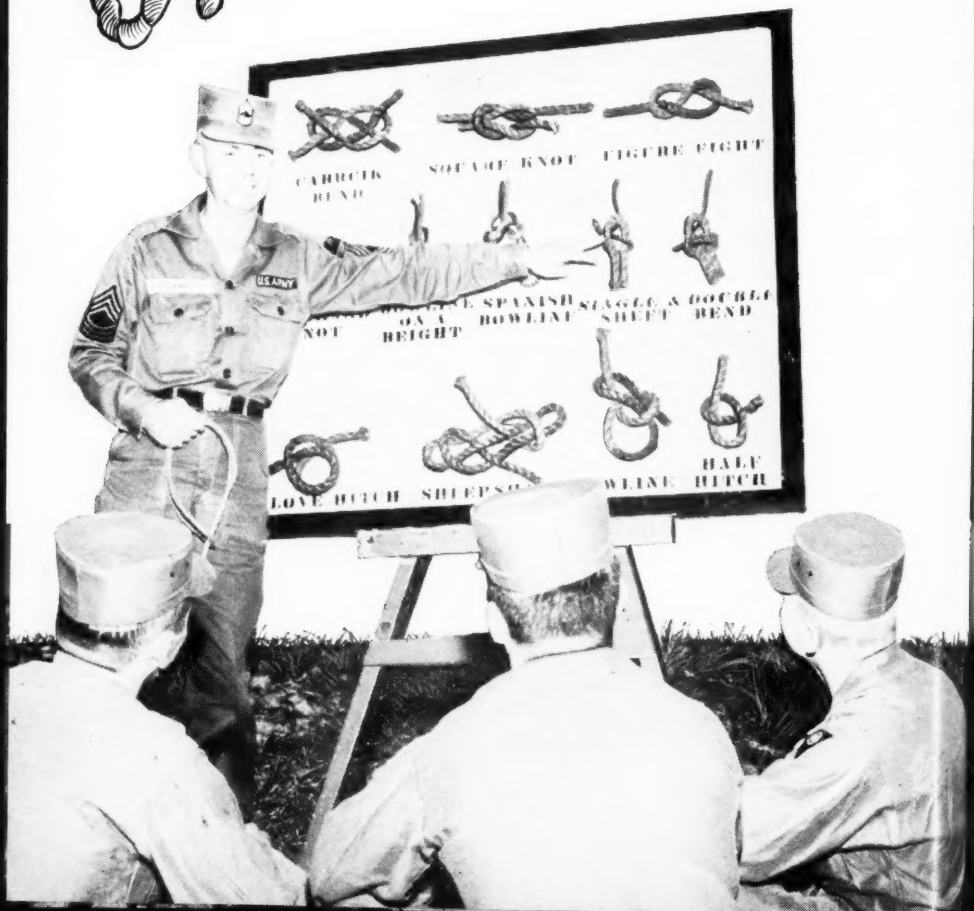
Students get thorough briefing on all phases of airline operations when they check in at TWA headquarters.

Part of indoctrination includes study of jet engines, above; propellors, below; and cockpit of passenger airliner, right.

How airlines use a conveyor system to overhaul engine is explained, left. Intricate instrument panel is studied, below.

At Fort Knox Automotive School, they practice field expedients while

Learning The Ropes



# of Vehicle Recovery

Sergeant First Class David B. Smith

WITH gathering momentum, the 2½-ton Army truck rolls headlong down the steep slope and comes to rest amid the cattails and reeds of a Kentucky swamp. As wheels spin in the frothing mire, the uptilted vehicle sinks deeper with each turn.

Not just an accident or deliberate sabotage, this is simply a practical introduction to a field problem in vehicle recovery for trainees at the U. S. Army Training Center, Armor, Specialist Training Regiment Automotive School, Fort Knox, Kentucky.

SERGEANT FIRST CLASS DAVID B. SMITH is assigned to U. S. Army Training Center, Armor, Specialist Training Regiment, Fort Knox, Kentucky.

Army vehicles are surprisingly self sufficient, the men learn. A demonstration at the school shows how to run a jeep with one wheel blown off —and it makes no difference which wheel is missing. For the sake of demonstration, a rear wheel is removed, and a heavy log about four feet long is brought up and wedged under the vehicle to act as a skid. The whole operation takes about six minutes, and the jeep is again mobile.

The Automotive Recovery Site at Fort Knox is filled with strange and knotty problems. This is where the Automotive School students learn how

to free all kinds of Army vehicles from mud, ditches, and the many adverse conditions commonly encountered in combat.

In one seemingly insoluble problem, a truck is found stuck at the bottom of a very steep bank. The men pour gallon after gallon of water on the bank until the mud is so soft and slick that it is impossible to stand upright on the grade.

The instructor tells his class that the huge truck will free itself from the mire at the bottom and move up the hill using its own power. Use of the winch mounted on the front of some Army trucks is precluded because the vehicle is turned with its rear end facing the bank.

As the students watch, great inch-thick ropes are brought into play. Steel bars are inserted into the hub-cap section of the rear wheels. Ropes are tied to the bars, the truck is shifted into reverse and the massive vehicle winds itself up the bank like a boy winding a string on a spool.

Varied Situations

AUTOMOTIVE students must learn the equivalent of a course in applied physics. The principles of pullies, the lever, the wheel and the inclined plane together with numerous knots and hitches are taught.

Rope work is such an important part of the recovery technique that a station has been set up at the field

A quarter-ton vehicle with one wheel blown off can be made mobile again with aid of stout timber or log wedged up under frame to form a skid.

training site devoted entirely to knots and knot tying. Trainees must learn the proper knot for the proper job for two important reasons: First, the knot must be strong, safe and well suited for the job it is to perform; and second, because ropes and cables are often irreplaceable under combat conditions, care must be taken to insure that a knot will not kink or snarl. The wrong knot could cause a kink that could weaken or even break the strongest cable.

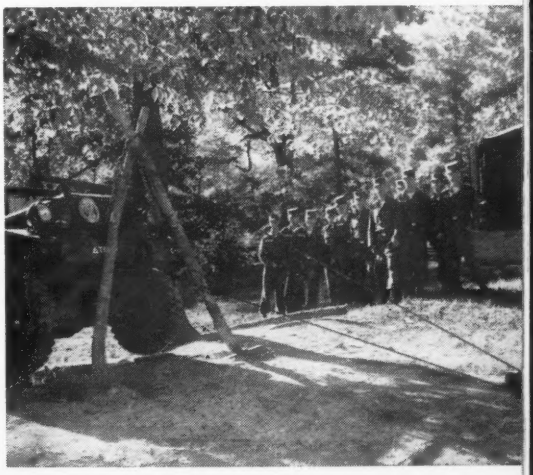
Safety is emphasized at the recovery site, just as on a rifle range. Students are taught to treat the ropes and cables that are used in lifting and hauling thousands of pounds of dead weight just as if they were loaded weapons.

The vehicle recovery class emphasizes use of available materials to perform a job normally done with heavy equipment such as jacks and lifts. Students are reminded that if the terrain in a given area contains a stand of timber, it can provide heavy logs that are the basic tools needed to perform most jobs. Students soon learn that a vehicle weighing many tons can be lifted, turned, righted or even carried if enough timber is available.

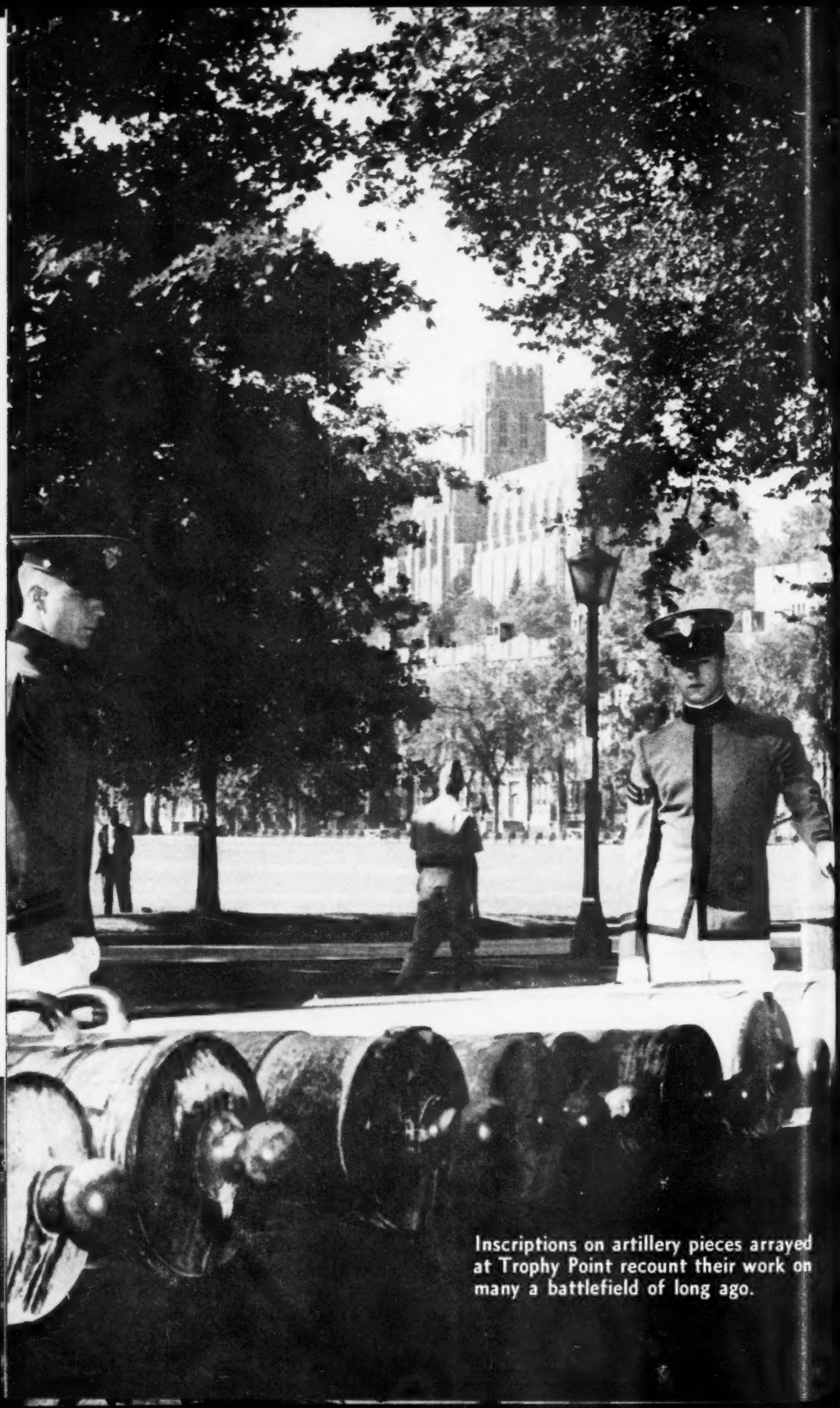
The students spend two days at the recovery site, as part of the eight-week course taught at the Specialist Regiment Automotive School. The automotive course consists of 280 academic hours, 111 of which are devoted to practical work on wheeled vehicles. Instruction covers Auto Maintenance, the Engine, Chassis, Body, Frame and Cab, Fuel and Carburation, the Electrical System, Transmissions, Trouble Shooting, and Preventive Maintenance.

Successful graduates receive a 630.00 (Mechanic's Helper) Military Occupational Specialty before returning to their units. Some graduates, after a period of duty with a unit, go on to receive advanced automotive mechanics training at appropriate U. S. Army Service Schools.

Using its own winch, truck above is prepared with heavy A-frame, then hoists itself up over intervening obstruction.



With aid of steel bars inserted in hubcap sections of rear wheels, mired truck can haul itself out of a steep mudhole.



Inscriptions on artillery pieces arrayed at Trophy Point recount their work on many a battlefield of long ago.

The West Point Museum—
a priceless repository of

Military History on the Hudson

THE West Point Museum, located in the U. S. Military Academy's historic Thayer Hall, drew more than 293,000 visitors last year from all parts of the world. Its galleries, glistening, compact, and covering 16,450 square feet, contain exhibits ranging from a miniature reproduction of the aftermath of Pickett's fateful charge at Gettysburg to rare pieces of ordnance and uniforms. Its holdings have been described as "the largest balanced military collection in the Western Hemisphere."

The Museum was founded in 1854, but was moved to its present site in 1958. Originally an Ordnance and Artillery Museum, it has since expanded to include all phases of military development. While most military museums concentrate on telling only a national history, the one at West Point traces the historical development of the military art throughout the world.

Impressive as they are, the public galleries contain only one-seventh of the items in the Museum's possession. Others are in study collections, on loan, or located elsewhere at the Military Academy. In all, the Museum has some 30,000 articles in its custody.

As Mr. Frederick P. Todd, Museum Director, points out: "West Point itself is the Museum, not just these few rooms." West Point, 159 years old, has been caught up in the history of the United States, and a walk around its grounds offers many silent testimonials to its role.

A museum staff of 13 screens all presentations made to the Academy in the form of memorials. Theirs is the responsibility for maintaining and displaying significant mementoes of military history and West Point tradition. Following are scenes of historic exhibits which cadets and visitors encounter every day, that require unceasing care by the museum staff.

In diorama above, Gen. Pickett reports to Gen. Lee after Gettysburg charge. At left visitors see Revolutionary War slogans.

Cadet examines a 1917 version of entrenching tool in a display of World War I weapons, posters, maps.

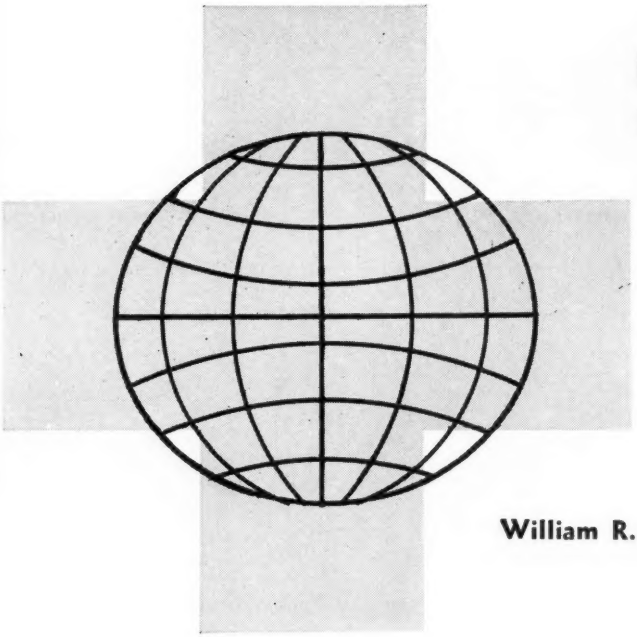
French Charleville musket of 1763, first weapon carried at Academy in 1802, is examined by museum curator Gerald Stowe and a cadet. Many historical items are in storage.

The "ultimate weapon" of his day was knight in armor — a display popular with children.

Below, cadet views an exhibit tracing life of Gen. Eisenhower.

At home and on duty,
around the block or across the world,
the Red Cross continues

Serving



William R. Breyer

THE young soldier in Korea had just received a terrified letter from his wife back in California informing him that she had been getting anonymous phone calls threatening her life.

Across the world in Munich, Germany, an Army sergeant got word that his mother, living in a Central American city, was due to undergo surgery and might not survive.

At Fort McClellan, Alabama, a serviceman's apartment was destroyed by fire. His six-month-old daughter perished. The soldier, his wife, and their four older children survived.

These three instances of servicemen's problems are among the thousands that engage the concern of the American Red Cross the year around. The Red Cross field staff is stationed wherever there are numbers of U. S. military personnel—as far east from Washington, D. C., its national headquarters, as Saudi Arabia and as far west as the Philippines. In virtually every time zone around the world, Red Cross workers somewhere are working in behalf of U. S. servicemen and their dependents every hour of every day.

In all three of the stories cited, the Red Cross was able to help solve the problems, and the first two had wholly happy endings.

The Red Cross field director in Korea flashed a report on the wife's frantic state of mind to the hometown chapter in California. The chap-

WILLIAM R. BREYER is on the staff of National Headquarters, American Red Cross.

ngservicemen Worldwide

ter in turn sent a Home Service staff worker to the wife's home, to relieve her anxiety and help her take appropriate action with the authorities. They traced the offensive phone calls, and the person making them was put in a mental institution.

The Munich field director cabled a query to the U. S. military mission in the Central American city. It replied, three days later, that the mother was to undergo an operation that day, and promised a report on the outcome. In another three days the word came from the Red Cross to a relieved sergeant—"OPERATION SUCCESSFUL. NO COMPLICATIONS. PATIENT DOING WELL."

The Red Cross could not bring back to life the baby who had died in the Alabama fire. But in other ways it could and did help the family return to something like normal living.

First, the field director with the Anniston Chapter helped the family handle funeral arrangements. He then worked with the post housing officer to get the family temporary housing and seek a new permanent home.

Finally, after reviewing the family's financial needs, he gave them a Red Cross grant to cover the funeral, clothing for the wife and children, food and other incidentals. The Army would provide house furnishings and take care of the serviceman's clothing needs. Since his payday was only four days away, the family would soon be self-sufficient again.

Diversified Services

IN THE more than a million requests for help or information the Red Cross receives in the course of

Aiding servicemen to solve problems is a major responsibility of Red Cross field directors everywhere.

Red Cross workers in military hospitals perform many personal services such as doing shopping chores for patients.

a year, many can be satisfied with a simple answer to a question. Others call for a rapid exchange of telegraph or cable communications extending over several days. Still others require painstaking work, extensive correspondence, or both for several weeks.

Take, for example, the serious situation facing a serviceman in Japan. His mother's life hung in the balance. Even with surgery, doctors gave her only a 50-50 chance of recovery and without the presence of her son in the difficult days ahead, even less chance than that.

But the man was in prison, awaiting trial on charges of having committed a serious crime against a Japanese citizen. Bringing him home entailed much more than a simple emergency leave.

At the request of the military authorities, the Red Cross obtained all possible background information on the mother's condition and other aspects of the home situation. Word came back that the doctors—though not the mother herself—knew about the son's difficulties; but they felt an operation was hopeless unless he could come home.

With this information in hand, U. S. Army and Embassy representatives went to the Japanese authorities. With their consent, the Army gave the young man a 30-day emergency leave.

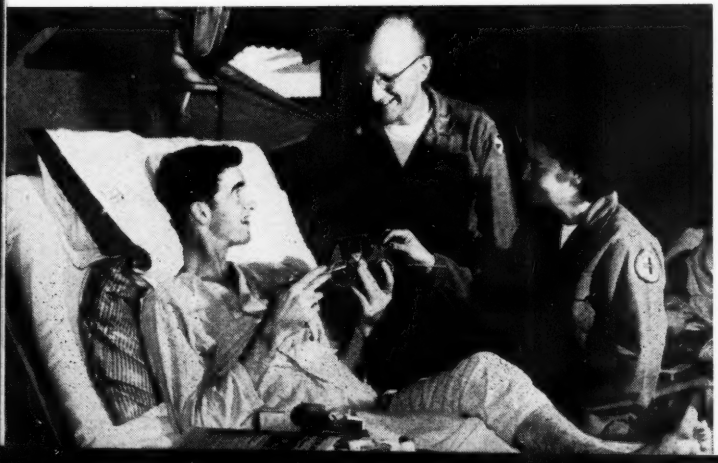
Arriving at Travis AFB in California, he found the Red Cross ready with financial assistance to cover round-trip commercial plane tickets and a reservation on an eastbound plane. Within hours he was at home.

When the operation was over and the mother had recovered, the son returned to Japan, while his mother, still unaware of the trouble he is in, looks forward to the day he will come home for good.

Home, Hospital and Field

MANY thousands of Red Cross volunteers and a national staff of over 2,100 full-time workers serve Armed Forces members and their dependents at military installations and hospitals in this country and overseas, as well as veterans and their families.

Thousands of Home Service staff



Army surgeon looks on as Red Cross worker helps patient in Korea put finishing touches on a model.

A field director in Korea discusses personal problems of a soldier on duty with an armored unit.

workers and volunteers in the 3,700 Red Cross chapters provide the same services to military dependents and servicemen on leave that field directors perform at military posts and hospitals. They also work with Red Cross field directors in speeding the processing of veterans' claims for government benefits.

The Red Cross world-wide communications system utilizes a leased telegraph network in the United States, connecting with military cable facilities overseas. Last year messages were transmitted over this network at the rate of one every 2½ seconds—1,278,000 in all.

Besides its social welfare services of counseling and assistance on personal and family problems, communications, and emergency financial assistance, the Red Cross carries on an active recreation program for patients in military hospitals—a service which helps speed convalescence of the ill and injured.

Recreation also is provided to able-bodied soldiers in Korea through informal audience - participation programs conducted by Red Cross clubmobile aides. Since this activity was begun in the fall of 1953, clubmobile girls have traveled over 773,000 miles —116,500 last year alone.

Opportunities to explore oversea recreational resources and to meet the local citizenry are offered by the staffs of five off-post centers in France and Morocco. A sixth center is scheduled to open in Turkey this spring.

Services to the Armed Forces and veterans comprise the largest share of Red Cross activities. These cost the organization about 40 percent of its annual expenditure and absorb over half the time of its staff and volunteer workers each year. Expenditures in the 1959-60 fiscal year alone amounted to $33,558,000.

On way to join her husband in Bermuda, a serviceman's wife and family get help from a Red Cross field director.

Shielded by masks, hoods, gloves, three rifle squads go through combat paces—

Dressed for Survival

IN A Chemical Corps test of men and equipment, 19 medical research volunteers recently ate, slept and performed infantry combat tasks for 72 hours while continuously encased in masks, hoods, gloves and other protective clothing.

Although a chemical toxic atmosphere was nonexistent, the simulation of it was sufficiently realistic to provide a severe test. The volunteers were formed into three rifle squads—one of attacking Aggressors and two defending several acres of Maryland tidewater territory in the vicinity of the United States Army Chemical Research and Development Laboratories at Frederick, Maryland. Smoke and simulated artillery fire added realism to the battle scene.

The Army's new M17 protective mask with built-in diaphragm for

A contamination-free experimental feeding station allowed men to remove masks to eat during the test.

voice transmission was adjudged to have functioned successfully. The new mask operates with a minimum of breathing effort with the old style canister being eliminated. When used with the hood, the ensemble protects the entire head and neck area against chemical and biological agents and radioactive particles.

Tests were made on devices for feeding the soldier in a toxic atmosphere. An experimental device such as a feeding-drinking tube for the mask worked out well in the case of drinking water but the volunteers were not so enthusiastic about taking heavier nourishment in this manner.

An experimental feeding station—a large box-like tent with pressurized ventilation — appeared more feasible. The men poked their heads into the tent through elastic openings and ate by thrusting their hands into sleevelike "reach holes." Thus they could remove hoods and masks to eat C-rations in a sort of non-toxic oasis.

The men reported they became accustomed to their hooded existence after initial periods ranging from six to 24 hours. Physiological effects of the extended period in protective gear were studied closely and continuously. Consensus of the men was that, faced with an actual extended chemical attack, soldiers could use the protective equipment and continue their mission for long periods—"especially if one can get water."

The project was conducted by the Laboratories' Directorate of Medical Research in conjunction with the U.S. Army Chemical Corps Board and with the support of the Laboratories' Protective Development Division.

Hooded, masked, gloved and wearing chemically treated clothing, two men of medical research team fire on "attackers" as they carry out typical combat missions.

STARCOM—Strategic Communications System

OPENING of the world's largest automatic relay station at Fort Detrick, Maryland, in December 1960 marked completion of the Strategic Army Communications System (STARCOM) designed to give split-second control over far-flung Army Commands. STARCOM can now send a message through the East Coast Relay Station in three seconds.

The station, built at a cost of $25 million, makes the Army's communications network fully automatic in continental United States. Eventually the unit will be part of the Defense Communications Agency, providing service for other Government agencies.

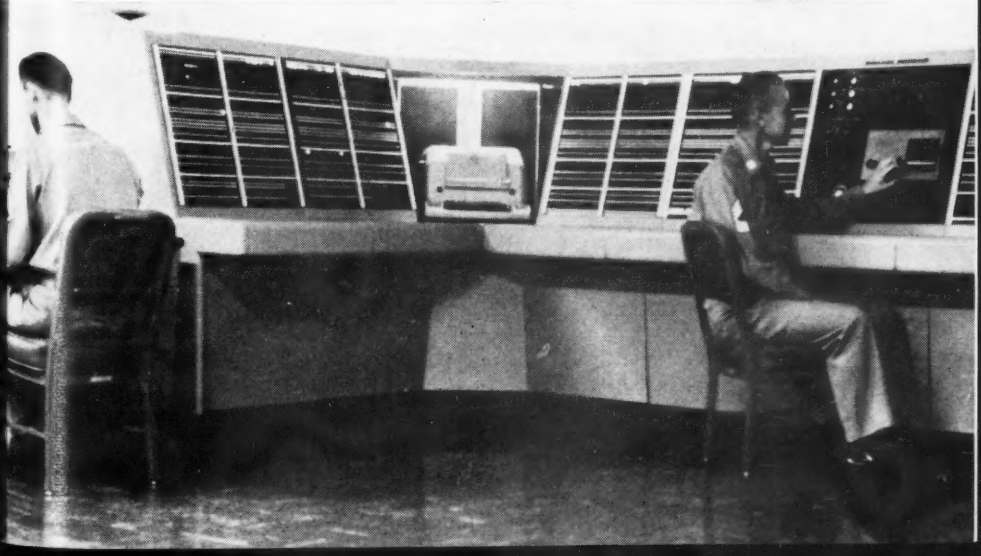
For high-speed automatic handling, messages are recorded on perforated tape, then converted back to printed

Operations room of the East Coast Relay Station at Fort Detrick shows various components of the AN/FCC-30.

messages at their destination. A total of 275,000 messages can be handled each day, and the control station can store 5,000 messages at a time.

The new East Coast Relay Station is one of the three in the United States that sends and receives messages by troposcatter—bouncing signals off atmospheric layers high above the earth. Its advanced capabilities were produced by an Army-industry team consisting of Automatic Electric Company, Northlake, Illinois; Kleinschmidt Division of Smith-Corona-Marchand, Deerfield, Illinois; and Collins Radio Company, Cedar Rapids, Iowa, working in conjunction with the U.S. Army Signal Corps.

At supervisory control console of the automatic teletype switching system, skilled specialists can quickly spot mechanical difficulties, send out trouble-shooters.



Cross-country driving conditions are realistically simulated by this

Tank Training Device

A MOTOR throbs into life, panel instruments light up, various gages register, and a fledgling tank driver is under way—but not in a real tank. A training device that realistically simulates driving conditions for tank drivers now is being tested by the Automotive Department of the U. S. Army Armor School, and if adopted is expected to reduce the high cost of using actual tracked devices to train new drivers.

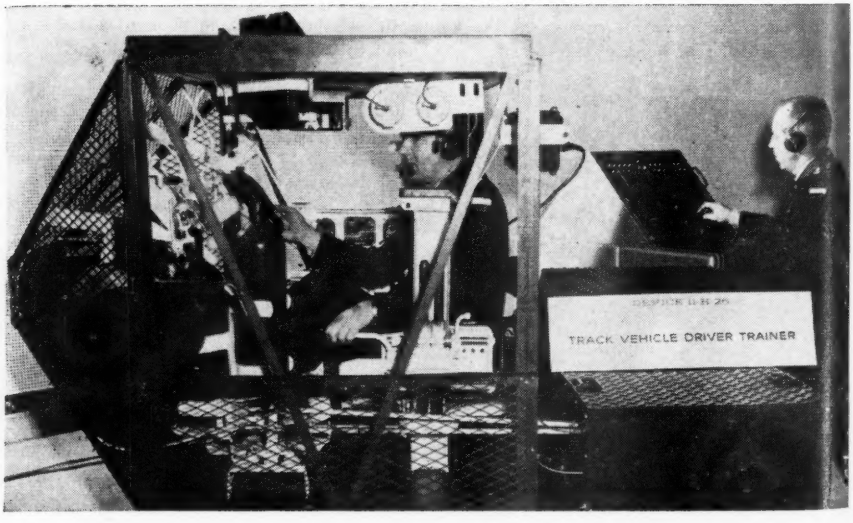
Developed for the Army under a contract with the U. S. Naval Training Device Center, Port Washington, New York, the trainer simulates the complete driving cycle, with electronically-computed sound effects to make it all more realistic.

The Tracked Vehicle Driver Trainer —produced by Transdyle Corp., Albertson, New York—consists of an operable driver compartment mockup and an interconnected instructor's console, designed to teach proper driving practices for the new M48A2 medium tank. Switches, gages, instruments, gear action are all authentically reproduced; these are activated through an electro-mechanical system that includes analog computers and audio equipment.

An instructor can introduce a range of "faults" and "emergency" situations such as instrument failure, engine malfunction, oil-pressure failure, under a variety of driving conditions which the trainer is capable of simulating. A study now is being made on desirability of adding a visual presentation to make driver training even more realistic.

Various new techniques incorporated in the machine are expected to have wide application to driver, mechanical and technician training programs in civil life.

The trainer simulates the complete driving cycle of the Army's new M48A2 tank, including synchronized sounds of start-up, main and auxiliary engines, transmission.



NEWS of professional interest

Little John Battalions

Activation of the first Little John battalions early this year will add to the Nation's growing missile power. The First Missile Battalion, 18th Artillery, and the First Missile Battalion, 57th Artillery, are scheduled for early activation at Fort Sill, Oklahoma. They are to be assigned to Fourth U. S. Army. Each battalion will have four Little John launchers.

Savings Bond Canvass

A person-to-person canvass at each U. S. Army installation or activity will be conducted during May in the interest of the Army Savings Bond Program. Objective of the 1961 canvass is to indoctrinate each nonparticipating individual in the merits of establishing allotments for purchase of U. S. savings bonds.

Nike-Zeus Tests

Target-track radar equipment of great range and unprecedented accuracy, built for the Nike-Zeus system, has been installed, energized and now is being tested on Ascension Island. It will be used to track intercontinental ballistic missiles fired from Cape Canaveral, Florida, some 4,500 miles distant. Information will be used in the Nike-Zeus system now in advanced development.

A 40-man staff operates the Ascension Island installation for Western Electric Company as prime system contractor under the Army Rocket and Guided Missile Agency as technical supervisor. The radar there was produced by Bell Telephone Laboratories, contractor for Nike-Zeus design and development. Continental Can Company, sub-contractor, made the huge radar mount.

Meanwhile, a complete Zeus system is being installed on Kwajalein Island in the Pacific, where a forthcoming series of tests will see the missile fired to intercept reentry bodies of ICBM's launched from the California coast.

Environmental Test Laboratory

Environmental testing of missiles and components to provide cloudbursts, searing heat, intense cold or jungle humidity will be possible when the new Test and Evaluation Laboratory is completed at the Army Rocket and Guided Missile Agency, Huntsville, Alabama. The facility will house under one roof the most comprehensive means in the Free World for environmental testing of live missiles. It will accommodate complete weapons up to 36 feet long and eight feet in diameter.

A missile getting the full treatment will be shaken, vibrated, spun, balanced, measured and weighed for four weeks, while exposed to temperatures ranging from —80°F to 180°F, X-rays, fungus growths, ultra violet light, drenching rain, salt spray, sand and dust storms, high altitude conditions and steam baths. Nearing completion at a cost of $3,500,000, the facility will be made available by the Army for use by other services, governmental agencies and industrial missile contractors.

Medical Research Reports

Papers on professional and technical subjects received for clearance by the Army Surgeon General's Office during 1960 totaled 1,210. Written by Army Medical Service personnel, these papers ranged in content from complexities of internal medicine to problems of outer space.

Survival Food Packet

An "All-Purpose Survival" food packet has been developed by the Army Quartermaster Corps for emergency use in any combat situation in any climate, even where water is severely limited The new packet is based on food bars of uniform nutrient composition—bacon or cheese-flavored, wheat cereal, cornflake, fudge or fruitcake.

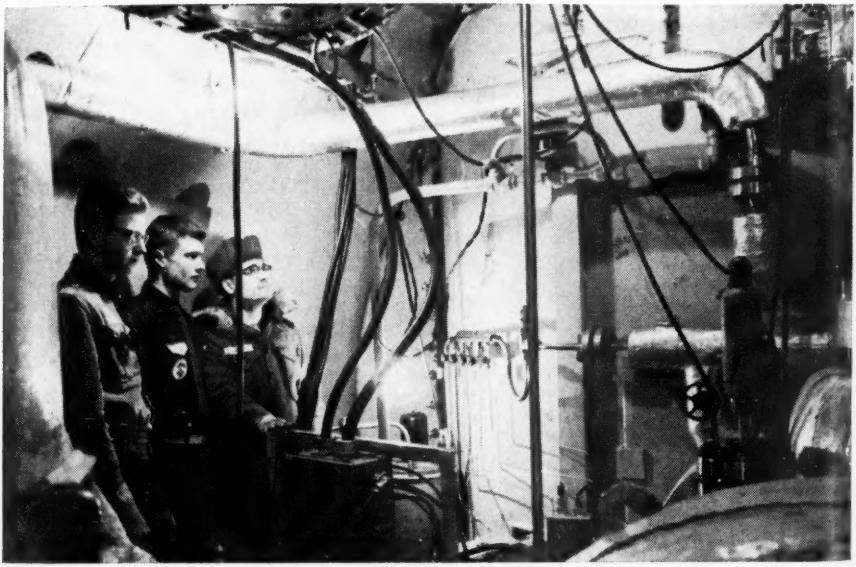
A prototype test packet includes four

food bars packaged with instant beverages in a 12-ounce container to give 900 calories. The composition of the bars permits assembly of the packet in any multiple, shape or size to meet anticipated emergency needs. This permits greater logistical efficiency and supply simplification by reducing the number of survival rations in the system—a Quartermaster goal since World War II.

Adoption of the packet, now undergoing further evaluation after having passed extensive service tests, would eliminate existing Arctic and Tropic Survival food packets from the supply system.

In developing the ration, consideration was given to needs of men with plenty of water or a lack of it—since food of high caloric level when eaten without water will cause severe dehydration. With the new kit, a survivor could eat what he needed when water was plentiful, or could eat any one bar when water supply is low or nonexistent, without seriously dehydrating his body. Thus the uniform nutritional design would enable survivors to adjust food intake to their needs based on such variables as available supply, probable energy output and length of time before rescue can be expected.

Scouts at Camp Century



TWO EXPLORER SCOUTS, chosen after a series of international tests and qualifying examinations, spent last winter at Camp Century, the city under the snow built by Army Engineers on the Greenland Icecap. Here Soren Gregorsen of Denmark, left, and Kent Goering of Neodesha, Kansas, are instructed in operation of the nuclear reactor by Captain Harvey Arnold, officer in charge of the plant—first to be installed in a remote area for field tests.

The reactor—operated by Army Engineers of the Polar Research and Development Center—supplies all of the electricity needed for survival at the base which is 140 miles from any settlement or military installation. The Scouts also visited storage pits of diesel fuel, toured the tunnels under the ice and snow where men of the expedition live and work, and witnessed the Ballistic Missile Early Warning System in operation at nearby Thule.

Air Conditioned Missile Vans

A lightweight, small air conditioner delivering 50,000 BTU per hour and weighing only about a third of conventional models is being tested by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia. It has been designed primarily for use in control vans of Hawk and Sergeant missiles. Use of aircraft-type components reduce its weight and size.

Nike-Zeus Course

Army military and civilian personnel are being trained in missile handling and firing techniques as well as in operation of the electronic brains designed to guide the Nike-Zeus to intercept attacking intercontinental ballistic missiles. The new eight-week course at White Sands Missile Range will be followed by a week's study of the missile warhead and another two weeks of familiarization with the type of Nike-Zeus test facilities being installed at Point Mugu, California, and Kwajalein Island.

Missile Age Warehouse

The U. S. Army's first missile age warehouse now functioning at Redstone Arsenal, Huntsville, Alabama, is a warehouse without storage bins, fork lifts or other traditional fixtures. Instead, a massive electronic computer handles missile parts control virtually hands off. Orders are received by direct wire transmission that produces a punch card ready to go into the computer. The computer then replies the same way for direct transmission to the manufacturer or Army depot that will supply the parts. It also orders new items, replacing those taken from stock. A train load of missile parts can thus be handled as easily as a single item.

Competitive Parachuting

Policies and procedures governing competitive parachuting activities of Army personnel are contained in AR 95-19, 5 January 1961. The newly published Regulation states that participation by active duty Army personnel in properly planned and supervised free-fall competitive parachute jumping is authorized as an exception to AR 95-19, and will be fostered and encouraged.

Pershing Performance

In a recent successful test firing of a Pershing ballistic missile at Cape Canaveral, Florida, both stages fired as planned and all test objectives were met. Instrumentation measured reaction of the inertial guidance system components to extremes of shock, temperature and stress.

Patterson Memorial Award

The ninth annual Patterson Memorial Award was presented recently to Second Lieutenant Howard R. Mosley of Passaic, New Jersey, chosen as the outstanding graduate of the Infantry Officer Candidate School, Fort Benning, Georgia, during Fiscal Year 1960. The award was made by Mrs. Robert P. Patterson before a distinguished group of visitors headed by Secretary of the Army Elvis J. Stahr, jr. Lt. Mosley, 23, now is reconnaissance platoon leader of the First Airborne Battle Group, 187th Infantry, 82d Airborne Division, Fort Bragg, North Carolina.

TV Instructor Training

A new Vidicon tape system, recently put in operation at the U. S. Army Signal School, Fort Monmouth, New Jersey, utilizes TV tape in instructor training. Television cameras transmit the instructor's image to a Vidicon camera chain in a control booth adjacent to the classroom. The picture is recorded on tape, and then is shown immediately to the instructor trainees. Thus they can see themselves from the perspective of future students and improve their teaching techniques.

Unifying Snow Research

First steps in a plan to unify its two agencies conducting research in the field of snow, ice and frozen ground has been announced by the U. S. Army Corps of Engineers. On 1 February, the Snow, Ice and Permafrost Research Establishment (SIPRE) at Wilmette, Illinois, was redesignated U .S. Army Cold Regions Research and Engineering Laboratory (CRREL) and, concurrently, the Arctic Construction and Frost Effects Laboratory (ACFEL) at Waltham, Massachusetts, was placed under the command jurisdiction of the CRREL. This action paves the way for consolidation late this fall when the two agencies will merge and move into CRREL facilities presently under construction at Hanover, New Hampshire.

School Redesignated

Designation of the Army Medical Service School at Brooke Army Medical Center, Fort Sam Houston, Texas, has been changed back to Medical Field Service School. The school, charged with developing and promulgating doctrine on principles and methods of field medical service, was known as the Field Service School for 35 years, then five years ago became the Army Medical Service School. It has now returned to its original title.

Aviation School Award

For its outstanding work in "significantly increasing the helicopter's effectiveness" as a reconnaissance and suppressive vehicle, the U. S. Army Aviation School, Fort Rucker, Alabama, has been given the Grover E. Bell Award by the Institute of Aerospace Sciences. The award was presented to Major General Ernest F. Easterbrook, school commandant and commander of the Army Aviation Center, at an IAS Honors Dinner in New York.

Dental Health Campaign

A campaign to maintain dental health of the U. S. Army at its present all-time high has been launched by Major General Joseph L. Bernier, Chief of the Dental Corps, as that service reached its half-century mark in March. The campaign emphasizes preventive aspects of dental health, with the dental officer and his assistant forming the basic team of the military dental service.

The Army trains some 400 dental specialists each year at the Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas. Another 150 technicians are trained to make prosthetic devices to replace teeth lost through accident or disease. Each year, a limited number of dental internships are offered to senior students at approved dental schools. Candidates selected are commissioned as first lieutenants in the Dental Corps, U. S. Army Reserve, and serve on active duty for a one-year internship.

Armed Forces Strength

Total strength of the Armed Forces as of 31 December 1960 was 2,492,708. Army strength on 31 December was 876,662; Navy, 629,045; Marine Corps, 176,178; and Air Force, 810,823.

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A quiver-full of firepower with folding fins—

XM72 Rocket Grenade

The Infantry's Armor-Piercing Arrow

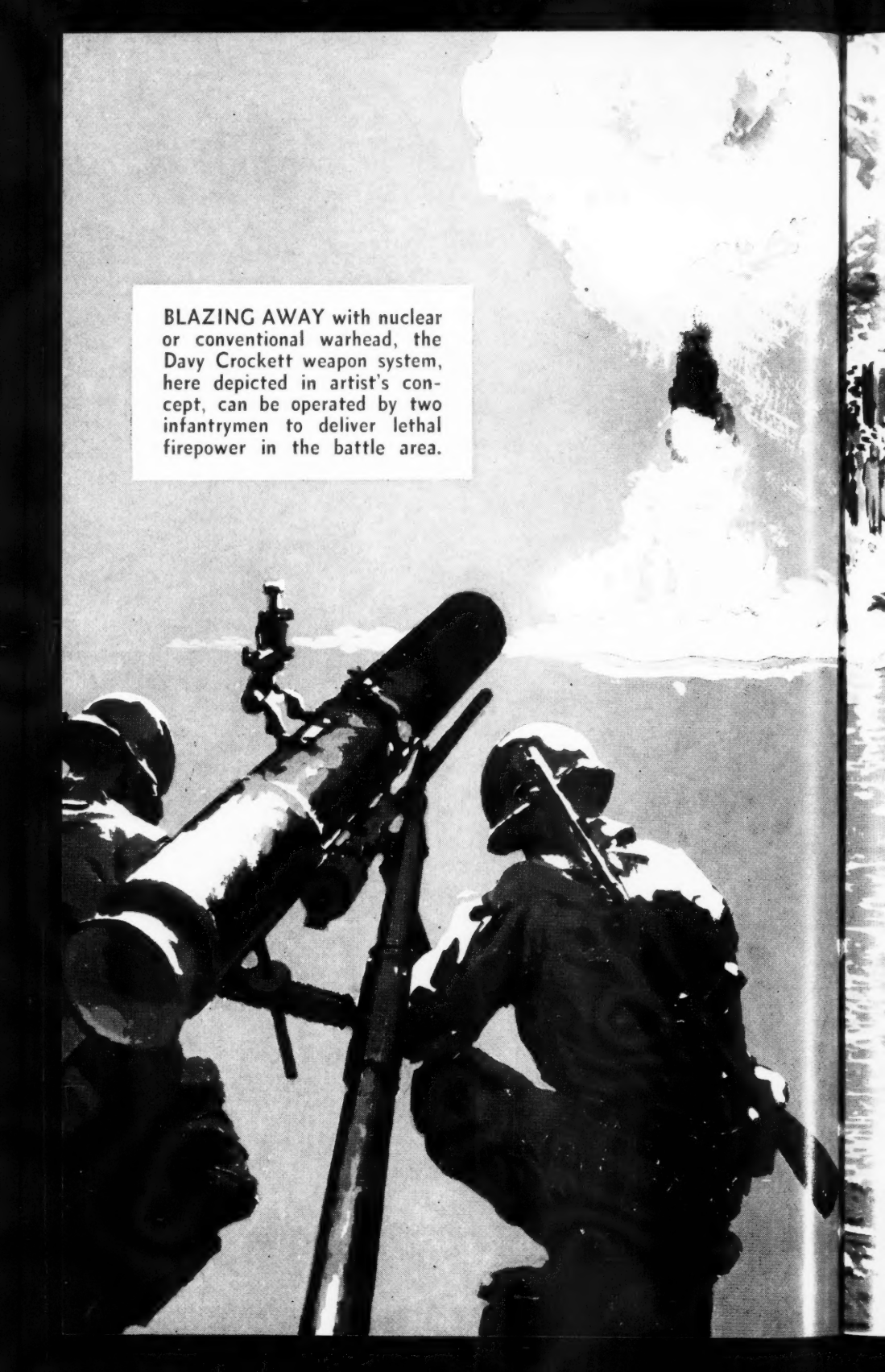
A SMALL, light, simple rocket grenade that can be carried and fired by one man and is highly effective against armored vehicles and fortifications has been developed jointly by the Army and industry. Known as XM72 Rocket Grenade, it weighs only 4½ pounds, and is carried over the shoulder in a throw-away case which also serves as the launcher. Each grenade is fitted with a canvas sling, and as many as four rounds may be carried in a canvas pack slung over the shoulder like a quiver of arrows.

The XM72 carrying case is 25 inches long, three inches in diameter, with telescopic aluminum inner section that is extended before firing. The outer section is composed of fiber glass plastic. Propulsion is by a solid fuel motor which burns out before the rocket leaves the tube; upon emerging, narrow magnesium fins which are folded against the motor case when packed spring into position to stabilize the weapon in flight.

The firing mechanism is mounted on top of the launcher tube, and aiming is accomplished by a rear peep sight and a graduated sight imprinted on a clear plastic rectangle at the mouth of the launcher tube. The warhead itself uses a powerful Army Ordnance-developed explosive known as OCTOL. When teamed with a 90mm recoilless

rifle, the new rocket grenade would provide the Infantry soldier with additional protection against enemy tank attacks.

The XM72 is readily adaptable to mass production. Prime contractor for the new system is Hess-Eastern Division, Flightex Fabrics, Inc., of Everett, Massachusetts. The Army Ordnance Missile Command was responsible for overall development.



BLAZING AWAY with nuclear or conventional warhead, the Davy Crockett weapon system, here depicted in artist's concept, can be operated by two infantrymen to deliver lethal firepower in the battle area.